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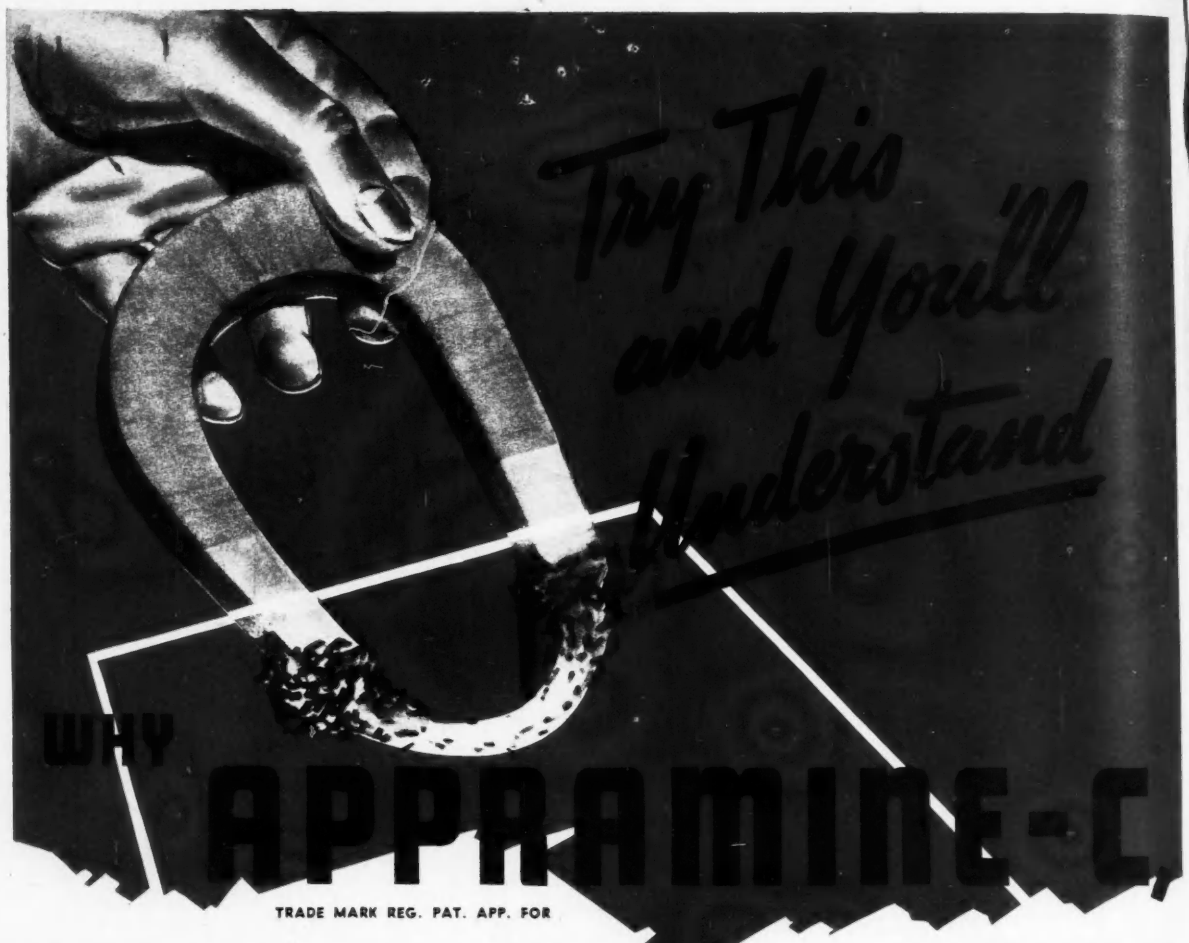

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NOVEMBER 13, 1939

VOLUME 28 NUMBER 23

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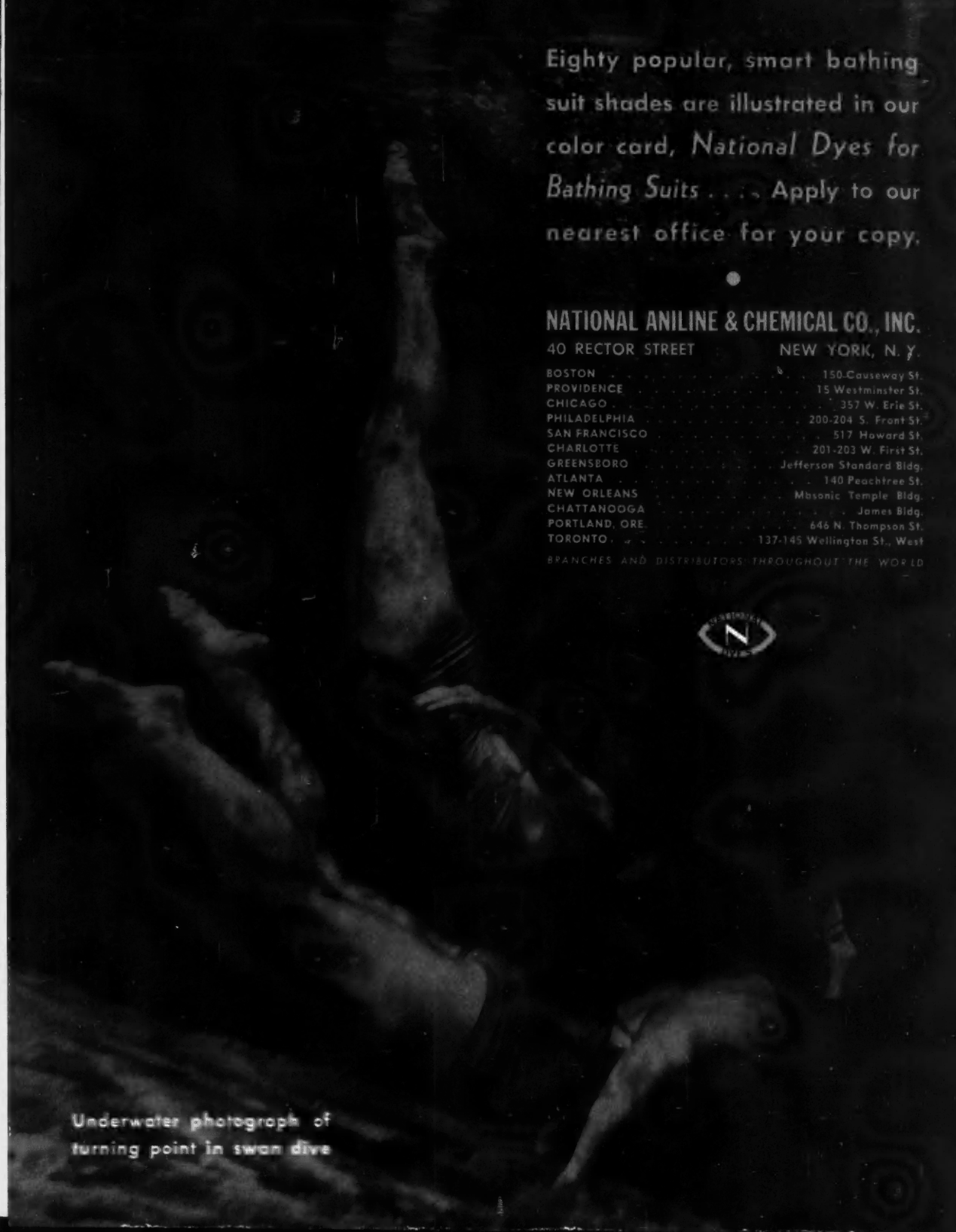
1940 BATHING SUIT COLORS



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Underwater photograph of turning point in swan dive

AMERICAN
DYESTUFF REPORTER

VOLUME 28 NOVEMBER 13, 1939 NUMBER 23

Photochemical Decomposition of the

Cystine in Wool*

HENRY A. RUTHERFORD and MILTON HARRIS**

The work reported in the present paper is a continuation of earlier work on the photochemical decomposition of wool. The data confirms the hypothesis that the primary action of the radiation, which results in a change in the state of the sulfur and a corresponding lowering of the cystine content, is independent of the moisture in the system. The results indicate, however, that moisture plays an important role in the secondary process, namely that involving the evolution of hydrogen sulfide from the irradiated fibers. It is also shown that decomposition of the cystine resulting from thermal reactions under the conditions of these experiments, is negligible.

I. INTRODUCTION

In two earlier papers on the effect of light on wool[1, 2] it was shown that one of the chief points of attack is the disulfide group of the amino acid, cystine. The data suggested that the primary action of the radiation is an activation of the disulfide group, resulting in a change in state of the sulfur, and a corresponding lowering of the cystine content. A secondary process, involving the evolution of hydrogen sulfide from the irradiated wool, then occurs. The rate of the primary reaction, that is, the decomposition of the cystine, appeared to be independent of the amount of water vapor in the system surrounding the fibers during irradiation. It was believed, however, that water might play an important part in the secondary reactions. The work reported in the present paper is a continuation of the earlier investigation.

II. EXPERIMENTAL PROCEDURE

The apparatus, with the exception of a few minor changes described below, and technique of operation were the same as described in detail in an earlier paper[2]. The wool samples were irradiated in specially constructed tubes, in atmospheres of moist and dry nitrogen. The nitrogen, which was used as a carrier gas to remove the hydrogen sulfide formed during the irradiation, was first freed from oxygen by passing it through two towers of alkaline pyrogallol. The emerging gas was divided into two portions, one of which was moistened by passing it through distilled water, while the remainder was dried over anhydrous magnesium perchlorate and phosphorus pentoxide. From the drying and moistening towers, the gas passed through the exposure tubes and finally into an alkaline solution of bromine for absorption of hydrogen sulfide. The smooth, elliptical aluminum reflector, used around the lamp and exposure tubes in the original apparatus, was replaced by a corrugated reflector in order to insure a more nearly uniform irradiation of the fibers. A stopcock was inserted between the tubes emerging from the drying and moistening towers so that both exposure tubes could be supplied with moist or with dry nitrogen at the same time.

Single-ply wool yarn of very low twist was used for the exposures. The yarn was prepared from raw wool which had been extracted with Stoddard solvent and washed with water. It was further purified by extraction in a Soxhlet apparatus with alcohol and ether, for 6 hours each, and finally washed with water at 50° C.

(1) Effect of Light on the Cystine in Wool

Twenty 100-mg. portions of the yarn were wound on adjoining layers on each of the two hexagonal glass frames. The wool on one frame was dried in an oven at 105° C. for 3 hours, then rapidly transferred to the exposure tube, where it was further dried in a stream of dry nitrogen at 90° to 100° C. for 24 hours. The exposures were then started, dry nitrogen being passed over the dried sample and moist nitrogen over the other. During the exposures, the frames were rotated as described earlier[2]. After different time intervals, two of the 100-mg. skeins, one from the top and one from the bottom of each frame, were removed from each of the exposure tubes and analyzed for cystine by the Sullivan method[3] using the hydrochloric-formic acid mixture for hydrolysis, as described by Miller and du Vigneaud[4]. The cystine contents of the samples after the exposures are shown in Table 1.

*This is the fourth publication of the Research Program of the Textile Foundation at the National Bureau of Standards.

**Research Associates at the National Bureau of Standards, representing the Textile Foundation, Inc.

TABLE 1

The Cystine Content of Wool After Irradiation in Atmospheres of Moist and of Dry Nitrogen

Duration of exposure hrs.	*Moist Nitrogen*		*Dry Nitrogen*	
	cystine %	*sulfur* %	*cystine* %	*sulfur* %
0	13.2	3.57	13.2	3.57
98	10.1	....	10.1	....
196	8.2	....	9.2	....
299	7.0	....	8.0	....
394	5.7	....	6.8	....
493	5.2	2.99	6.3	3.35

(2) Effect of Temperature

The temperature in the exposure tubes as measured by a mercury thermometer (the bulb of which was covered with a thin layer of wool yarn) varied between 65° and 70° C. Since the temperature coefficient of most photochemical reactions is known to be small compared with that of most thermal reactions, it is hardly likely that the rate of decomposition of the cystine was appreciably affected by this small variation in temperature.

In order to determine whether some of the cystine was destroyed by thermal reactions alone during the long exposures, samples of wool were heated in the dark in atmospheres of moist and dry nitrogen at 60° and 105° C. An experiment was run at the higher temperature since it was conceivable that the temperature on the surface of the fibers might be somewhat higher than that indicated by the thermometer. The wool yarn was placed in glass tubes in an oven, and nitrogen, dried or moistened by passing through towers of phosphorus pentoxide or water, was passed over the samples at the rate of about 3 liters per hour. The nitrogen was preheated to the desired temperature after leaving the towers by allowing it to pass through about 12 feet of copper coil in the oven. After different time intervals, duplicate samples were removed for sulfur and cystine analyses, the result of which are shown in Table 2.

TABLE 2

Effect on the Sulfur and Cystine in Wool of Prolonged Heating in the Dark

Temperature °C.	*Duration of heating hrs.*	*Total sulfur*		*Cystine*	
		moist %	*dry* %	*moist* %	*dry* %
...	0*	3.55	3.55	12.7	12.7
60	210	3.57	3.60	13.3	13.3
60	500	3.53	3.56	13.4	13.4
105	192	3.55	3.56	12.5	12.4
105	408	3.55	3.52	11.7	12.3
105	600	3.50	3.55	12.2	11.7

*Untreated wool.

(3) Nature of the Primary and Secondary Reactions

Samples of the wool yarn were wound on the glass frames and irradiated in atmospheres of moist and dry nitrogen for 200 hours. The lamp was then turned off, the temperature maintained at 70° C, and moist nitrogen passed over both samples for about 300 hours. Finally, the lamp was again turned on and both samples were irradiated in atmospheres of moist nitrogen for an additional 300 hours. The rates at which sulfur, in the form of hydrogen sulfide, is evolved from the wool are shown in Figure 1.

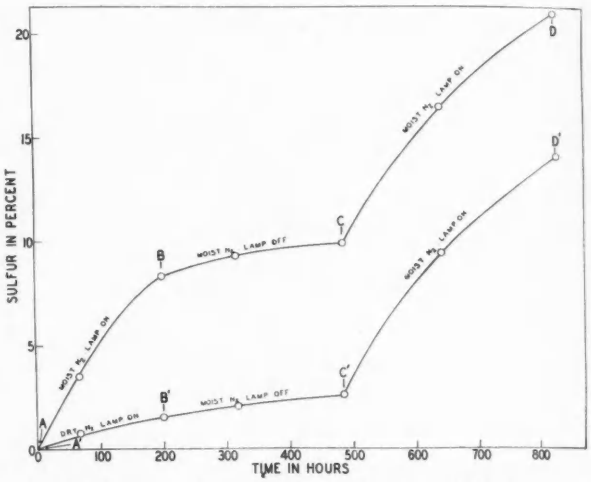

Fig. 1—The rate of evolution of hydrogen sulfide from wool (1) during irradiation in atmospheres of moist and dry nitrogen, (2) in the dark in atmospheres of moist nitrogen, the temperature being maintained at 70°C, and (3) during irradiation in atmospheres of only moist nitrogen. The ordinate values are in terms of the percentage of the total sulfur which was evolved as hydrogen sulfide during the treatment.

III. DISCUSSION

The data recorded in Table 1, showing the relative rates of decomposition of cystine during irradiation in atmospheres of moist and of dry nitrogen, confirm the earlier observation that the primary action of the radiation, which results in the decomposition of the cystine, is independent of the moisture in the system. The cystine contents of the samples irradiated in atmospheres of moist nitrogen are slightly lower but in view of experimental difficulties, such as keeping the intensity of the light on both samples equal* and constant, these small differences cannot be considered as significant at this time. Furthermore, the differences are extremely small when compared with the difference between the rates of evolution of hydrogen sulfide from wool irradiated in atmospheres of moist and of dry nitrogen.

The decomposition of the cystine under the conditions of these experiments appears to result from photochemical rather than thermal reactions. As was pointed out previously, the temperature in the exposure tube varied between 65 and 70° C. However, the estimation of the exact temperature on the surface of the fiber would be very difficult and for that reason, an experiment in the

(Concluded on page 678)

*When samples were irradiated under the same condition in both exposure tubes, hydrogen sulfide was evolved at the same rate. This was the basis for assuming equal intensity during subsequent experiments.

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NOVEMBER 13, 1939

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• CALENDAR • OF COMING EVENTS

Council Meeting, New York, N. Y., November 17, 1939.

Meeting, Philadelphia Section, Penn A. C., December 8, 1939.

Fall Meeting, South Central Section, Andrew Johnson Hotel, Knoxville, Tenn., December 9, 1939.
(This is the date of the Auburn-Tennessee football game.)

Annual Meeting and Convention, auspices New York Section, 1940. Date to be announced later.

Banquet Session

Nineteenth Annual Meeting

September 16, 1939, Boston, Mass.

Toastmaster: **HENRY D. GRIMES**

Greetings by
CLARENCE NUTTING

MR. CLARENCE NUTTING: Ladies and Gentelemen, I am very happy at this time to greet you once more on this, the final session of the Nineteenth Annual Meeting of the A.A.T.C.C. and extend to you on my own behalf and on behalf of the Northern New England Section a sincere welcome to this dinner. I shall not encroach very much upon your time, because we have a program which I know you are looking forward to.

However, I cannot let the opportunity go by of calling your attention to the men who are responsible for the arrangements of this meeting. I want you to know that we of the Northern New England Section appreciate the tremendous amount of work that the committees have put in under the able leadership of the Chairman. I am going to ask the Chairman to stand up now and take a bow, Mr. Walter Zillessen. (Applause)

I also want you to know the members of his Committee and the Sub-committee chairmen. I will ask them respectively to stand and likewise take a bow.

Mr. H. P. Selya—Chairman of Publicity and Exhibits Committee. (Applause)

Mr. Edward E. Bell—Chairman of the Reservation and Registration Committee. (Applause)

Mr. Michael J. Lane—Chairman of the Dining and Entertainment Committee. (Applause)

Mr. Kenneth H. Barnard—Chairman, Reception Committee. (Applause)

Mr. Charles Schmitt—Chairman, Sight-seeing and Transportation Committee. (Applause)

We have been advised that the member who came the longest distance, according to our records—and we wish to be corrected if we are not correct—is Mr. G. R. Kremers of Minneapolis, Minnesota. Is Mr. Kremers here? (Applause)

The guest from the longest distance, likewise, from Minneapolis—Mr. F. L. Remus. (Applause)

I believe that concludes my remarks. I will now turn the program over to our Toastmaster, whom you all probably recall as having been the Chairman of the Section at the time the Annual Meeting was held in Boston in 1931. He will act as your Toastmaster tonight.

I am glad at this time to present Mr. Henry D. Grimes. (Applause)

Toastmaster Grimes: Mr. Chairman, we are very happy indeed to have such a wonderful turnout from various parts of the country on this Nineteenth Annual Convention of the American Association of Textile Chemists and Colorists. "Kelly" Zillessen, our genial General Chairman, has been apologizing for the weather. As they say in Los Angeles and in the southern part of California generally, "it is quite unusual weather for this part of the country at this time of the year"—and it really is. The air conditioning system went on the bum yesterday afternoon, and we haven't been able to fix it. (Laughter). The east wind which usually takes care of those matters in this part of the country at this time of the year seems to have gone WPA or something of the sort. (Laughter)

Incidentally,—speaking about Walter Zillessen, ("Kelly" to you) and the Chairman of our Northern New England Section, Clarence Nutting,—this Committee has been holding numerous, sundry and frequent interesting meetings during the past season, arranging for this convention. This summer, the heat being something like it has been these last two days, they decided they would hire a boat and go sailing for the week-end as a Committee and whack up the final arrangements on this convention.

A good time was had by all in spite of the usual seasickness. They weren't very good sailors, but they decided that they would elect a captain, a mate and other officers of the crew and really do the job up right for the week-end. "Kelly" was elected captain for the week-end and Clarence was elected the mate for the week-end. It was their duty to keep a log of the cruise. Clarence wasn't so well the first day. "Kelly" kept the log. You know, Clarence indulges (he imbibes milk and that sort of thing), and "Kelly" made an entry in the log, among other things, "Mate drunk all day." (Laughter.)

Well, when the mate got to feeling better the next day, the captain wasn't feeling so well and it rather burned the mate up to have that sort of an entry made against his name because he isn't that sort of guy. He figured out long and carefully how he would get back at the captain. He made the entry in the log that day, "Captain sober today." (Laughter)

In 1931, eight years ago, when we had the convention here before, Mrs. Grimes was in the audience, checking up on a lot of things—you know, about the toastmaster, and so forth. After it was all over Joe Bryant, loyal to the core, was having a terrific argument with some member from

distant parts. It was something to this effect: Joe said to him, "Say, bo, what's the idea of referring to our toastmaster as a windbag?"

Mrs. Grimes perked up her ears and thought she would learn what it was all about. Joe started to berate the chap who said, "Wait a minute. You've got me all wrong. I didn't call the toastmaster a windbag. What I asked was, 'Who called that windbag a toastmaster'?"

These microphones are always a help, but they are more or less of a nuisance, also. I think it was General Smedley Butler who compared them to cuspidors—(laughter) no darn good unless you hit them. (Laughter)

Along that line, I think that here at the head table perhaps we ought to have a little practice tonight in the manipulation of these mechanical devices for enhancing the quality, tone, pitch, caliber and general delivery of one's voice, and get the distance from the microphone just about right. I am speaking in a little louder than a normal conversational tone of voice, though not much. Is this distance too close when I speak to you?

Members: Yes.

Toastmaster Grimes: Is this distance back here too far away?

Members: Yes.

Toastmaster Grimes: Well, how is this distance, about here?

Members: Just about right.

Toastmaster Grimes: How are we going to measure that? I should say if you put your thumb to your mouth and get just about a span of the hand and fingers to the microphone you will have the distance just about right. (Demonstrated). Keep that in mind. (Laughter and applause)

Our National Secretary, Dr. Harold C. Chapin, very courteously invited me to have luncheon this noon with the national officers and the sectional committee officers. There was a general round-table discussion after the luncheon. He made the remark during the meeting that perhaps I might pick up some ideas and suggestions for wisecracks tonight. I will have to admit it wasn't very fertile territory. They are a bunch of scientific ducks when they get behind closed walls and there wasn't much hilarity there.

It was interesting, however, to note the number of men from different parts of the country who took part in the discussion and their various accents. We managed to conduct the meeting without an interpreter. I think that is quite remarkable when you consider that we have fellows from the Deep South and fellows from New England here. (Laughter.)

I rode through New York State a few weeks ago. Beside the main highway there were a number of signs. The sign would tell you the flower of a state. You would go along a mile or two and there would be another sign which would tell you the flower of another state. I thought, "How fine that is, keeping us up to date on the botanical background of these various states." It occurred to me that in this convention we have men from Virginia — and I believe their state flower is the dogwood —there are fellows from Georgia whose state flower, I believe, is the magnolia, and from Pennsylvania, the wild rose, New York the thistle, and so on, and so on and so on. I thought it would be nice to make a sort of poetical reference to all these various parts of the country until it suddenly dawned on me that the state flower for the great Commonwealth of Massachusetts is the codfish. (Laughter)

You will admit that that has an aroma all its own, but I didn't know whether it would be quite so poetic. The Egyptians have a word for it; it Sphinx. (Laughter).

Incidentally, the codfish being the state flower or whatever you may imagine—there is a little quip that goes something like this—and I think it may be appropriate to the advertising possibilities in our Association, and the good job of advertising that our Northern New England fellows did in connection with this convention, but they don't play up the codfish in this so much as they do another animal:

The codfish lays a million eggs and the helpful hen lays one,
But the codfish doesn't cackle to tell us what she has done.
And so we shun the codfish coy, but the helpful hen we prize,
Which indicates to you and me that it pays to advertise.

I suppose that is why you are all here in such large numbers. (Laughter and applause)

Thank you. I was hoping that some of my stooges out there in the audience who are purposely planted would at least applaud at the proper time. I suppose we ought to plan to give them some little signal so they will know when the proper time arrives. It seems to me such a signal in our association where we use as our emblem the three rings of Anthracene would be something like this: When we want applause we shall indicate three rings (using a popular advertisement) and we shall get the appropriate applause. (Laughter)

You fellows have conducted a very well behaved convention. Really, it has been quite remarkable. There has been only one complaint that I know of registered with the management of the Copley-Plaza Hotel. It seems one lady on the fifth floor telephoned the manager in great perspiration late yesterday afternoon. She said, "I don't like the goings-on."

"What's the matter?"

"There is a man across the court who is taking a bath."

The manager rushed up to her room. He looked across the court. Sure enough there were the head and shoulders of a man taking a bath. The manager said, "I guess you

are right, but that is a rather high window and all you can see are his head and shoulders."

She said, "Yes, that's what you think. Just climb up on that bureau and see what you see." (Laughter)

It is so blooming hot here tonight it reminds me of the Irishman who was looking for a job. He didn't seem to have any luck. Someone told him they were going to do some new work at the Panama Canal, but he was warned, "It is going to be terribly hot, 115 in the shade."

He thought a minute and said, "Be gorra, you don't have to stay in the shade, do you?" (Laughter)

Somebody said that the toastmaster is the punk who sets off the after-dinner fireworks, so here goes, folks. I will take you into my confidence. This is not going to be a long program. We have adopted as our slogan here at the head table a little motto, a revised beatitude, if you please. It goes something like this: "Blessed is the man who is not longwinded for he may be invited again." (Laughter)

It is now nine-five according to my chronometer, Eastern daylight saving time, or fast time, to you hill-billies down South who don't understand us Northerners anyway. As near as I can make out from the program—I am going to take you into the confidence of the head table here—it is going to be something like this, so you may relax and enjoy yourselves and feel confident that you are not going to sit here until midnight listening to long-winded scientific dissertations. We are going to present some of the past officers and present officers who are seated at the head table. They will not speak. They will make a pretty bow and smile. (Laughter and applause)

We are going to listen to our President-Emeritus for about five minutes, our President for about five minutes, the Governor's representative for five minutes, and our speaker will have forty minutes. He said he would only need twenty-five minutes, but we got bighearted with him and told him to shoot the works and take forty minutes.

That ought to take us until ten o'clock. I think in spite of this heat you can stand a program that is as brief and concise, and I can assure you ahead of time, as interesting as this is bound to be.

I shall first present to you those whose works have spoken for them, to whom we owe and proudly give honor. I hope we shall express to them in our applause our appreciation for, in many cases, the years of work which they have given as our representatives in high office. They have done this work for *us*.

We have already met the General Chairman of the Convention Committee and his committee. We have already met the Chairman of the Northern New England Section, Clarence Nutting. I give you Dr. Harold C. Chapin, the National Secretary of the American Association of Textile Chemists and Colorists. (Applause)

Mr. P. J. Wood, Past President. (Applause)

Dr. Carl Z. Draves, perennial Chairman of the Program Committee. (Applause)

William R. Moorhouse, the man who handles the cash, the Treasurer of the National Association. (Applause)

Arthur R. Thompson, Jr., the Vice President. (Applause)

A note has been passed up to the head table. I wish that we might have known about this earlier so we could have done justice to the occasion. Mr. Sam Wood, President of the Canadian Association of Colorists and Chemists, is here with us this evening. I wonder if Mr. Wood would stand up so we may recognize him. (Applause) And as we have thus expressed ourselves by our applause, I am sure that I express the feelings of the gathering and of the Association when we extend through him as he returns to Canada the cordial greetings, heartfelt best wishes, good fellowship and friendship of our Association to his Association. (Applause)

Governors of states are busy people. I am sure they are far busier than we realize or appreciate. We would have been especially proud if it had been possible for our Governor to be present this evening to grace this occasion and to bring you his own message, but that was not possible. He has, however, been gracious enough to send his personal representative, his personal aide, a man who has known the Governor intimately and personally for a great many years, having served with him during the World War.

I present to you as the representative of His Excellency, Governor Leverett Saltonstall, Captain Raymond Emerson.

Captain Emerson! (Applause)

Remarks by

RAYMOND EMERSON

CAPTAIN RAYMOND EMERSON: Mr. Toastmaster, Mr. Chairman, and Members of the American Association of Textile Chemists and Colorists: It is a great privilege to have been assigned to represent his Excellency, Leverett Saltonstall, the Governor of the Commonwealth, as your guest tonight. As many of you know, he is now in Philadelphia, unavoidably detained. He has instructed me to extend to you the heartiest greetings of the Commonwealth on this occasion of your national convention, and to express his most sincere regrets that he could not be here in person.

I also wish to apologize for the State of Massachusetts for the weather which we have perpetrated upon you. I have spent some years in Texas and Arizona, and I don't think I have ever seen anything much worse than what we are faced with tonight. I congratulate the members of the Association on their common sense and judgment in removing their coats. I only wish that I was able to do the same. (Laughter and applause)

There is no section of the United States where the

textile industry is of more vital importance than to us here in New England. For generations a great many men have invested their capital in that industry and a very large proportion of our citizens are dependent upon it for the earning of their daily bread. We have seen in the past ten or twelve years a number of textile industries forced to move away from the state or to close down on account of shortsighted legislation, or of exorbitant taxes brought upon them by extravagance in government. There is no man in my opinion who is more vitally aware of this situation than His Excellency Governor Saltonstall, or who is making a finer and braver fight to curtail the expenses of the government and to lend every possible aid to the industry.

No one is more aware of the excellent work of your own Association in the field of research and experimentation which has kept the United States in the forefront of the textile industry.

In closing I wish to convey to you the congratulations of the Commonwealth for the splendid work that you have done and to offer you its very best wishes for the future.

Thank you. (Applause)

Toastmaster Grimes: Thank you, Captain Emerson.

I trust that when you return you will carry to His Excellency the Governor our sympathetic appreciation for the splendid programs which he is attemping to carry through.

Our next speaker needs no introduction to this gathering. He is the President of the organization, and it would be rather out of place to present him to you.

You know, Mr. Eavenson is a scientist in his own right. Way back in the early days of his interest in things scientific he proved that by a rather remarkable experiment which has gone down in the annals of scientific history. It had to do with the demonstration to prove a pet theory of his, namely, that the hearing organs of grasshoppers were located in their hind legs.

The experiment as he conducted it ran something like this: He procured a six-foot board about three inches wide, balanced it in the palm of his hand, placed the grasshopper on the far end of the board, tapped the other end of the board with a hammer; the vibrations passing through the board entered the sensitive hearing organs of the grasshopper's hind legs caused nervous excitation in the grasshopper's hind legs and he jumped from the board—positive proof of the fact that the hearing mechanism was in the grasshopper's hind legs.

The negative proof went like this: Same grasshopper. Tears off hind legs. Places grasshopper at far end of board. Taps other end of board and grasshopper fails to jump off board, proving negatively as well as positively that the hearing mechanism of the grasshopper was in its hind legs. (Laughter)

Not only is he a scientist, but I have had the pleasure of meeting his very charming wife and I thought, "What a glorious family life they must have." She is a charming lady and he is a delightful gentleman, but I overheard a little conversation that he was having with one of his intimate friends. I wasn't supposed to overhear it. It seems they had a little family difficulty. In fact they had had a good old-fashioned fight. That is what it amounted to. His friend was saying, "Well, how did you come out with your fight with your wife?"

"I got the best of that," he said.

"Oh, yeah?"

"Yes, I got the best of that fight. She finally came to me on her knees."

"Oh, yeah?" his friend said, "And what did she say?"

"Come out from under the bed, you coward." (Laughter)

I give you our National President, Mr. Eavenson. (Laughter and applause)

Remarks by

ALBAN EAVENSON

PRESIDENT EAVENSON: I really didn't know that my scientific achievements had spread so far.

There was one remark of our genial toastmaster here with which I am heartily in accord, and that is the subject of brevity. It made me think back to our Eighteenth Annual Meeting down in Atlanta. Bob Philip and his various aids met us and escorted us to our quarters there. We sat there and went over the plans of all they were going to do to take care of us. I thought I would scare Bob a little so I said, "Bob, I have worked diligently over a speech and I really think I have something that is pretty good. I don't think it will take over forty-five minutes or so."

He said, "Well, now, I am just mighty sorry about that, because we are going to have Senator George here at the meeting. Senator George has just come through a red-hot campaign down here and everybody is all het up about it, you know, and they just won't care a picayune about what you have to say. Your limit is five minutes."

So I thoroughly agreed with that. We meet on common ground here. (Laughter)

I knew very well when I came down here that there would be some illustrious speakers here and nobody would give a darn anyway about what the outgoing President had to say, so I didn't prepare anything this time. I thought that perhaps I might pass along just a few of the casual remarks which occur at a convention and in mixing around with your friends.

Some of those casual remarks contain great truths.

They are like a woman's intuition or like a man's hunch, they really express a very great deal. I jotted down two or three of those remarks. They came, all of them, from prominent members here, men who are well known and looked up to and respected. One of them spoke quite seriously. He referred particularly to the rapid growth of this organization. He said it has grown rapidly and steadily, and just by reason of its very growth certain problems are created. They are sectional problems. Each section has its own local pride and its own enthusiasm, its own way of doing things.

These are really quite powerful forces and they should be harnessed so that they work for, rather than against the Association. Mr. Cady last year proposed this luncheon of the sectional officers, and I really think that that is going to do a great deal to harmonize all of these sectional interests.

I sometimes feel that perhaps we up here in the North do not give the South quite the recognition that we should. I suppose it is a delicate subject up here to speak about the exigencies of the cotton industry in the North, but I think I am entitled to speak of it because I am from Philadelphia and we are pretty much in the same boat. I know within the last six months we have lost some of our very finest hosiery mills. They have gone down South. I don't know just exactly what hosiery represents in the silk industry, but Mr. Cheney told me he thought it consumed about eighty-five per cent of all the silk we imported. When you stop to think of all the silk that is going down there, of the cotton that is going down there, and the fact that rayon is already well located in the South—and I who am in the wool business have had ample opportunity to see that wool is coming along quite well in the South—you will come to the conclusion that we must be prepared, I think, in the handling of our affairs to see that the South has its full measure of recognition.

I think it is really quite a problem to harmonize those interests.

Another remark that was made was made by one of your Past Presidents, too. He said, "What would you think of the idea of changing the term 'research?' Could we adopt something better? You and I who have been endeavoring to raise money to support research know how that subject just simply raises the fur on all mill executives. Would our efforts be perhaps more truly described if we characterized them as either mill experimentation or applied research?"

I told him that I thought that was well worth mentioning, that it was well worth consideration, because we have to figure out, Where does this lead us? I think we are all willing to recognize that the most serious and the most worthwhile attempt at fundamental research is now being done with the funds of the Textile Foundation down at the Bureau of Standards under the direction of Milton Harris. The results thus far have not been forthcoming at the rate that one might expect, but then it takes a long while to get the proper organization selected, to get the problems well defined, to get the apparatus, to get each man well settled into his job. That has been done, and the work is coming along very, very well, indeed. We are very optimistic about it, and I think within a year or not longer than eighteen months there will be a great deal to lay before this Association for very serious consideration, because the Textile Foundation realizes its need of this Association. They realize that while things may look very, very promising in the laboratory—results giving every indication that a certain experiment can be translated into a successful mill operation—never will be so translated without the aid of the practical men here who have the experience, the equipment and the knowledge to put it over.

I really think that that idea of more truly describing our work is well worth our consideration.

Another thought was presented to me. It was in the discussion of the work that is going along in research by all the various organizations. In the government branches we have the Agricultural Department, we have our Animal Industry, and we have this, that and the other agency down there at Washington, all doing more or less textile research. We have our home economics societies, women's buying societies, and God knows what. We have our own Association, we have the United States Institute for Textile Research, and here is this new technological Association and the ASTM. There is a whole horde of these agencies, each and every one paddling its own canoe, going along without regard to the others. No systematic effort has ever been made to correlate them, to organize or systematize this work.

On top of it a great portion of the work of the four regional laboratories will be on textiles, particularly on cotton, a million dollars for each one of them annually. Think of that! It is a tremendous proposition. All this work should tie in with the work being done elsewhere. I don't think it will ever be possible to get an organization together which could absolutely boss these various scattered organizaions, but I do think that there might be some central fount of information to which we can all go and have available just what is being done in other quarters.

I could talk quite at length on this subject because it has so many ramifications, but I think I have run out on my five minutes already.

On behalf of the members I think I should thank the Committees here who have worked so hard to bring about this very, very splendid Annual Meeting. I know what it is because I had something to do with it in Philadelphia two years ago. There is an immense amount of work involved. They have carried it through in fine style and they deserve our thanks and our appreciation.

I don't think there is any very dark secret concerning

the incoming President. I think we all know him, and, speaking personally, I want to congratulate the Nominating Committee on its wise selection. They selected a man who has worked faithfully for years in the interests of this Association and is deserving of the honor.

Above all, I would like to thank those who during the time of my office as President have extended so many gracious little courtesies which both my wife and I realize are not done personally but out of consideration for the position. We appreciate it and we thank you.

And now as I am about to return to the ranks with the dignified title of buck private, I wish to assure the officers that I am here at all times to obey their commands.

Thank you very much. (Applause)

Toastmaster Grimes: Mr. Eavenson, these have been great years under your leadership. I think that the thanks should be reversed. We owe you a debt of gratitude for what you have done and what you have meant in personality and in spirit. I am sure that I express the appreciation of the entire group in that respect.

(To the audience) It would do no harm at this moment if you would show your appreciation in any way you would like to.

. . . The audience arose and applauded . . .

Toastmaster Grimes: And now may I present to you another man who also needs no introduction, I am sure, to this gathering—our President Emeritus, and organizer of this Association: Professor Olney.

This organization had its first national convention some eighteen years ago, this being its Nineteenth Convention. I recall way back there in the old days, how he used to try to instill in us the true scientific spirit, that anything could be done.

There was an old colored workman, a man around the school there, who used to do odd jobs. Among those odd jobs was attempting to keep the windows clean.

Incidentally, some of the oldtimers will remember that seven years ago I told this same story on the Doctor. It appealed to me. I don't know whether you liked it, but I would like to try it again to see if it still works. This colored man-of-all-work was washing the windows and he was rubbing away on the window and blowing on it, rubbing and muttering to himself, "There never was and there never will be. There never was and there never will be."

Dr. Olney overheard him and thought that wasn't really the proper mental attitude for anyone in a scientific institution where nothing was impossible. So he took him to task and asked him why and so forth.

"Well," he said, "I'll tell you, Doc, it's like this: There never was and there never will be. There never was and there never will be a constipated fly." (Laughter)

That is a fine story to start off with, Dr. Olney.

Doctor, the microphone is yours. (Laughter and applause)

Remarks by

LOUIS A. OLNEY

DR. OLNEY: Mr. Toastmaster, Fellow Members of the A.A.T.C.C., and Invited Guests: A professor in an educational institution not far from here once found himself in rather an unusual situation. As you may know, it is a custom which has come down through many generations that if a professor does not arrive in the classroom, after a ten minute wait the class automatically dismisses itself. In this particular case the professor arrived in plenty of time, as a matter of fact, altogether too early, so he left his hat and coat and pile of books on the lecture table and went to attend to a few matters he had in mind.

This took longer than he anticipated and it was twelve minutes after time when he returned. He was rather surprised to find the students had entirely retreated.

At the next class he gave them a rather severe dressing-down and said, "You should have known when I left my hat and coat on the table that I was around and that I would soon return, and you should have remained."

Nothing further was said, but two days later when the professor arrived at the classroom, he saw a hat and coat on every chair, but found no students. (Laughter)

Having a sense of humor the matter was dropped and nothing more was said about it to the students. But since that time he has taken considerable pleasure in reporting this joke on himself. (Laughter and applause)

I think we may well put this situation into reverse, as you might say, on this hot evening. I am going to let you assume, that my presence here behind the speakers' table, will take the place of any formal address.

Quite recently while making an examination of our Year Book and the list of members I was really amazed to find how many of our original charter members are still very active in the work of the Association. I think the great success of this Association, of which we are all proud, has been due to no little extent to the activity of the original charter members.

If I were to make anything at all like a formal address, much that I would have to say, could undoubtedly be found in the "Report of the Research Committee," which has been published in the Annual Review Number. I will simply suggest that the next time you are wandering around the house, just trying to make up your mind what you are going to do next, that you go and sit down and take ten minutes to read that report.

I want to take this opportunity in closing to simply shake hands, as you might say, at a distance, with all my friends whom I have been unable to greet during this meeting. I have met many of them, hundreds of them in fact, many of whom were my former students, but at this

particular time I want to express my best wishes to those whom perhaps, I may appear to have slighted.

Thank you. (Applause)

Toastmaster Grimes: I have been requested to express to the main speaker who is to be introduced next the apologies of a few of the members in the audience who must catch trains. "If some of them have to leave," he says, "give them my congratulations."

That is what he said. I am not making that up. (Laughter)

We are very happy indeed this evening to have the honor, pleasure and privilege of having as our main speaker of the evening a man of such distinction in the field of chemistry, both theoretical and applied. He has done service in the sugar refining industry, in the optical industry, with Bausch & Lomb, with Arthur D. Little, Inc., in Boston, and with the National Research Conncil. He was decorated as an Officer of the Order of the Crown of Italy, in 1926. He is the author of several scientific books and articles.

He has a string of degrees like a diadem, including Master of Science, Bachelor of Science, Doctor of Science, Doctor of Engineering, Doctor of Laws—and so forth and so forth and so forth.

His subject tonight sounds rather terrific. It is "Ersatz Materials." But rather than attempt to translate that term I will turn the next portion and the final portion of this meeting and this convention over to our speaker, Dr. Harrison E. Howe, Editor of *Industrial & Engineering Chemistry.*

Dr. Howe! (Applause)

Remarks by

HARRISON E. HOWE

H. E. HOWE: Mr. Toastmaster, Presidents-Emeritus, Past and Present, Captain Emerson, Ladies, Members of the Association, Anybody else who may have been overlooked in this general preamble: I think your Toastmaster has made one or two mistakes. In his very graious introduction he forgot to tell you that I also played a harmonica under water. (Laughter) He made a little mistake about that windbag story a while ago, I thought, when he spoke about the Toastmaster being the windbag. I thought in these days of aeronautics one always said on an occasion of this sort that having sent up one or two trial balloons and they having gone well, we will now put up the big gasbag. (Laughter and applause)

There is so much to talk about these days. Of course, a group of this kind knows full well how frequently science has made a great impact on civilization, how often science has had to do with the balance of power of nations, how blockades in the past have been broken by the use of science. For example, in the days of the Napoleonic Wars when France was blockaded by Great Britain, the beet sugar industry had its beginnings. There were prizes for the one who might find a substitute for cane sugar.

I think we might well say that the synthesis of ammonia by the fixation of atmospheric nitrogen, is another example. That was not done under the same circumstances but through the realization that Chile had a natural world monopoly, and something had to be done to break it. You know of the work of Haber and his associates and how in the World War Germany depended upon the fixation of nitrogen for the production of her munitions. And so we can go through a long, long story.

I thought perhaps I could take the least chance by endeavoring to talk about these "ersatz" materials, knowing how well informed you gentlemen are: I believe the word "ersatz" in its present meaning first crept into the literature and usage during the World War when one of the German naval vessels was sunk, and on the Naval Register there appeared the name of another one, "Ersatz" for it. In other words, it was a substitute.

I am not very friendly to the word substitute, not because it is not a perfectly good word, but because to most of us it connotes something inferior. We know full well that many of the things that people call substitutes are really equivalents, and many of them are much better than those for which they have been substituted. Whether that will prove to be the case with the present ersatz materials, we have yet to learn.

I spoke a moment ago about the number of blockades in the past that have been broken by the use of science. The list is really quite long if you study it, but to the best of my information we have now in the procedure of Germany the first case where a nation has imposed an embargo upon itself. It has done that for several perfectly good reasons from the German point of view: The shortage of exchange with which to buy that which they might import is of course one reason. Another is its four-year plan by which the German government set out to make itself as independent as possible of the rest of the world, not only because of its economic position, but many of us believe because they looked forward to the time when they might become engaged in another war, and unable as before to import materials, they decided to find a way to avoid being under the same kind of pressure again.

So you have to look at this condition from several different points of view. Unless you have traveled in Europe, particularly, let us say, in Italy or Germany, or have studied the situation rather carefully, it is very difficult to realize what the difference is in raw materials which we enjoy here in the United States and what the paucity of those same materials abroad really means to a growing people like the German nation or the Italians. There are two good things about foreign travel. One is that it enables you to tell the other fellow what he missed when he went abroad. That seems to be the great joy of many

travelers. The other is to come home with a better realization of what we have on this North American continent, and be everlastingly grateful that we are where we are; and realize that while we don't war, we really do have something that is worth fighting for if it comes down to the last point.

There are a number of phases to consider regarding ersatz materials. What about cost? Well, there is nothing much you can say about cost. Here you have materials made for home consumption out of domestically occurring natural resources and paid for in Reichsmarks that are printed on the presses of the Reichsbank, from materials again, made in the country. So that there is nothing you can say about cost unless you try to compare it with respect to the man-hours of labor required in this country, or elsewhere, to duplicate the same sort of materials.

What does it matter to the Reich, for example, if Buna rubber may cost, say, sixty-five or seventy cents a pound, when they could buy natural rubber for fifteen to twenty cents a pound? It dosen't mean a thing in the world because that cost is not a real cost as they figure it, and if they wanted to buy more rubber than they have been importing they would have difficulty in doing so because of the lack of their exchange for imports.

So that while many of these things are entirely uneconomical from our point of view, that may not be the case from their point of view because they have a different objective.

When it comes to a matter of quality, we may have our suspicions as to whether things are as good as they are said to be. But from the standpoint of those who use them there is nothing to be done about it. For example, if you are told that Zell Wolle is just as warm and just as strong as natural wool, and you belong in the Reich and are told that by those in authority, then, by George, it is so. That is all there is to it. You just can't argue. (Laughter)

Some of us have been wondering just how long these ersatz materials under great stress of war use are going to be found satisfactory. I mean, for example, the types of alloys they have to use in their engines, the types of fuels they have to use in their airplanes, the types of fabrics that go into their tires and so on, up and down a long list. As far as satisfaction is concerned I have indicated what I think about that.

Last March I had the privilege of entertaining a couple of young folks from Germany. I had had an old guide near them of whom I thought very highly. I wanted to send him something and asked what he might like. They said, "One of those fine woolen scarfs you can get here."

I said, "What is the sense of sending a wool scarf over to Germany? You have something over there that is quite as good as wool."

They did not want to be disloyal to their Fuehrer and yet they wanted to make me understand what it was all about, so they said, "We have something that we are expected to use for wool, but we know that Mr. So-and-so who is getting on in years now has a bit of rheumatism and would like nothing better than one of those real wool scarfs that you have here in the United States."

So of course he was sent the real wool scarf.

The same thing applies to foodstuffs. Of course, you men realize that coffee making is a chemical process and the best coffee is made by the chemist in the house. I make the coffee in my house, for example. (Laughter) So when one of these young folks wanted to know something about how we make coffee, I took them out to the kitchen and made the coffee. The coffee having been made, I was about to discard the grounds when the young lady said, "Why, you aren't throwing those away?"

I said, "Of course. We have made the coffee. We don't want the grounds."

"At home we never throw them away. We take out a little now and then and add some new coffee, that is, the new substitute which is made by a careful blending of roasted barley and wheat and that sort of thing. You couldn't afford to throw away the coffee."

I said I realized then why it was I found so much poor coffee in Germany.

They make all sorts of self-sacrifices. Make no mistake about that. There is a great amount of self-sacrifice for which the German people deserve respect.

I spoke of the synthesis of the nitrates from the air. While the first synthetic ammonia was fixed in Germany, the first sodium nitrate was made commercially in these United States, and has been produced at a price to compete with Chilean nitrate in various parts of the world. This is a sample of the first of that nitrate that was made here. There is too long a story about that to go into detail, and I do not think in such hot weather you would be interested, but this weather does not bother me. I feel quite at home. I live in Washington, and while I am not there much in the summer, I know what it can be like. And I feel at home with you chemists. When I first heard someone say A.A.T.C.C., I felt sure it was one of those alphabetical organizations of which we have so many at home.

One of the questions in the press has been that of synthetic motor fuel. You will have to take my word for it that this is a sample of some of the motor fuel made by the hydrogenation of the tars from brown coal. The day I visited one of these plants they were making a thousand metric tons of this fuel by the Bergius process. Here is an example of a long time research instigated by Germany because she realized the importance of motor fuel yet posssesed no petroleum. Frederick Bergius began working on the problem early in the century, and, as a preliminary, synthesized anthracite coal from sawdust, just to get some idea of how petroleum might have been formed. Then he went on to this Bergius process which consists of

adding the gas hydrogen to the coaltar from brown coal, and preparing a liquid which is a very satisfactory motor fuel for ordinary purposes. It is not a high octane fuel and even with the use of tetraethyl lead up to the optimum percentage it probably does not go beyond ninety-three octane, whereas we have a large supply of materials from which to make one hundred octane fuel. If we need to, we can take a high octane fuel, add tetraethyl lead and go well above one hundred octane if necessary. But Germany has done very well with this type of synthetic fuel. You must also remember that you can design a motor to use the available fuel.

This synthetic motor fuel has been one of the important ersatz materials.

The Fischer-Tropsch process is one which has to do with the combination of the gases, carbon monoxide and hydrogen. That gives a synthetic type of fuel oil from which gasoline can be distilled, also producing a lubricating oil and a paraffin. This paraffin can be cracked and oxidized to produce a synthetic soap.

The soap does a fairly good job of cleaning, and without any extra charge leaves you delicately perfumed with the scent of petroleum, which I am sure you would very much enjoy.

A year or so ago, a dapper French chemist was over in Amsterdam on business and the Shell people gave him some of this soap to try. Of course at the very first opportunity, the next morning, he tried it. He had overslept a bit. He had to hasten to an appointment, and it was not until he had finished his bath that he found out just how fragrant he was from the soap. But there was no time to undo the damage, so he rushed off to his appointment. But the gods were with him that time because the man he went to see was a high official in the Dutch Shell Petroleum Company, who felt flattered no end that this particular Frenchman would dare to come out smelling as he did from this soap derived from the synthetic material.

I don't think he repeated the performance but at least it got him out of the hole for the moment. Nor do I think you would be very happy with this type of soap here. But don't forget that the various fats which go into soapmaking in our country are required for stock feeds and human foods and other purposes there and under those circumstances they use it.

About this Buna rubber story: I think my curiosity was satisfied this week when I had a chance to ask some of our chemists about it. Don't be misled about all the publicity about Buna. I think I am perfectly correct in saying that the honor for having produced the first synthetic rubber-like plastic commercially available in the whole world belongs not in Germany, but in these United States. I could even name the state. I could name the town, and I could come within a half dozen of naming the men who were responsible for that development. But advertising is out of order now.

When you hear about these things abroad, please get away from the feeling we used to have twenty-five years ago, that nothing good can come out of the United States. You fellows in the dye business know all about that. It also applies to many other things. When somebody tells you how good our friends are on the other side, agree with them right away, and then tell them just how good we are on this side. It won't do them any harm to know some of these things. Here is some of the Buna. That is the crude material, and here is some of it after vulcanization. Here is Vistanex, composed of giant molecules. It is derived from petroleum, not a synthetic rubberlike compound, but used in compounding. Here is the crude material, and one that has been vulcanized. Here is one of somewhat medium molecular weight, also used in rubber compounding.

How good Buna is depends on with whom you talk. Some will tell you it is no better than natural rubber, that by the time you have it sufficiently plasticized to work properly on rubber-working machinery it has lost many of the characteristics for which it is so highly valued. Others will tell you that if you know how to use it, it is at least two and a half times as good as natural rubber. Some day we will find out. Meanwhile, a friend of a friend of mine who was in a German town when the war games were going on, was chased out of town like other tourists and told to stay out because the motorized equipment was limping in from the war games, with blown-out tires and other rubber failures.

I couldn't put those two stories together until I met a man this week who thought he had the answer. He said the answer was not in the synthetic rubber—of course, they do have some natural crude rubber—it was in the failure of some of the synthetic fibers which they had tried to use in place of cotton for the fabric of the tires. Maybe he has something there.

The intention has been to make in Germany all the synthetic rubberlike materials they require for all rubber uses, and they have been imposing an import tax of one hundred per cent on crude rubber, the tax money being used to build still other plants to make more Buna.

Another one of the types of materials has been iron and steel clad with some of the metals that resist corrosion of various types, such as we have in the chemical industry, thereby utilizing a cheap, strong base material and stretching out the others as far as possible by using them as a coating such as I have here. This happens to be an American product I have in my hand, one in which a corrosion resistant alloy has been rolled down from a duplex ingot with steel as the base and supporting material. We know those tricks here, you see, but here we use them as a matter of reducing cost. There it is a question of necessity. Some very clever work has been done.

The use of certain of the resins in the same direction has been very interesting. The resin business, as you know, originated here in the United States, some thirty-two or thirty-three years ago, when Dr. Baekeland rescued an organic experiment that had gone into the waste jar and the report into the journal, and used that as the basis of an industry that now includes, I expect, five hundred trade named materials with a great range of raw materials of various kinds. Germany has developed some of these ideas, and has used resins in various ways. Wood, laminated with these types of resins, which are superior to some of the glues for that purpose, has been used extensively here, but as far as I know it has remained for our German colleagues to adapt two of our ideas and make a tube of spiral laminated wood which will answer for some metal uses and for pipes for conveying certain types of liquids. I have seen small tubes of that sort painted with aluminum and used to build frames of bicycles. I think in that service they might be strong enough. They have also perfected a thermoplastic resin, that is, one that is worked under heat and sets up under cold, on a modified typesetting machine, so that instead of using type metal they can mold type from these thermoplastic resins, thereby saving the metal for military and other uses.

The other molded products have also been very interesting. There are a number of different types. These are all American resins I have here. This is the Lucite of which you have read and heard so much, which has many very remarkable uses. I think one of the clever things is a tongue depressor. We all have our tongue depressed when the doctor wants to look at our throat, and these depressors made of Lucite with a flashlight attached make it possible to depress the tongue neatly and to throw light on the exact spot where the misery is to be continued by the doctor. (Laughter)

It also aids the dentist who can turn and twist these rods any old way he likes, of course, under heat, and then the light passing through throws a little spotlight right on the place where he wants most of all to drill deeper.

Some of our fellows have been pretty clever. Here a synthetic resin has been used as a binder for this particular little jar. It has a neatly turned top. The idea is to sell this full of cosmetics or perhaps foodstuffs and then, having served that purpose, you take the top and attach it to the bottom and you have a container for quite a different purpose. I understand it has even been known to break down sales resistance. (Laughter)

Here is another type. Just see how nicely these things are colored and how accurately they are molded to exact dimensions. It is another example of how these resins can be used for all sorts of purposes. This particular set was given to me under the name of "whoopee set," whatever that means. I merely use it to show how nicely they mold and how well they take color. (Laughter)

There are other types of synthetic materials that of course are "ersatz" over there, and here just something better than what we have had. I do hope you will remember, if you don't remember anything else I have said this evening, that here in the United States we still have a choice. However bad things may be, one way or another, we still have a choice of how we spend our money and what we do with our labor, and a new product does not have a ready-made market by any royal decree that says, "You must use a certain percentage of this material in everything you make." We do not do that here. A thing has to make its way on the basis of its own merits, some special service it renders, or perhaps some cost advantage. That is all there is to it. There are places in the world where you are told what to use, regardless of its quality, performance and price, and you have no appeal.

This particular bottle I have here holds synthetic camphor. I am carefully holding my thumb over the maker's label, but while I had nothing whatever to do with the manufacture of this camphor, I am proud of it, for the reason that twenty-five years ago, when there was another war, Japan had a natural national monopoly and Japan did not hesitate to advance the price of camphor about tenfold. We had to have camphor, not just in the medicine chest, but in motion picture films, in the plastics and other places in industry, and the price of something like three dollars and a half a pound was just too much.

Some work was begun here in two plants and at the close of the war we had two places capable of making this camphor, but the price was high and the quality was not satisfactory. For a time we imported some synthetic camphor from Europe. Then when the first of these twin depressions came along, the fellows had a chance to turn aside from production problems and re-examine some of the old research that had been put on the shelf. Out of that came a new process and a new plant began to make a technical grade of synthetic camphor. But the grade I have in my hand is USP, and you fellows know what that is, so that never again will the United States be pinched for the lack of camphor, whether it be for technical or pharmaceutical uses. I like that type of work and I am sure you do. It shows that research can and does pay, even though you may lay it aside and come back to find a better way. It is not a substitute—it is an equivalent. It is something better than what we have been getting. But in Europe it is probably regarded as an ersatz material.

I hesitate to talk about fibers before this audience. In fact, I don't think I should. Naturally, I brought no rayon along. I know you fellows prefer to see that on living models, and I did not know the rules of the dinner (laughter) but here is a sample of Zellwolle. I more or less stole this sample, but I thought you might like to see it. I tried very hard to get a piece of the cloth made of this Zellwolle but I was politely told that it was

not yet quite commercial so I couldn't buy it. I requested a sample and they wouldn't give it to me. I was watched so closely I couldn't steal it. (Laughter) But I did manage to get some of the fiber.

This is made by a variation of a rayon process. It is called an ersatz material but it is not truly one because the cellulose is derived from the spruce of the Scandinavian countries, Finland, perhaps some from Russia, and I assume some now from the forests that have been taken over with the consent, we are told, of the Austrians and the Czechs. (Laughter) That is one of the samples.

Now they have better kinds. Here are two small samples of some of the better types of fiber that are made in the manner I have just described. I realize you can't see them in the back of the room. I showed these to an Australian wool man who was located in South America, coming over on the ship, and told him I was not a wool man but wouldn't he please tell me what grades of wool there are. Without any hesitation he gave me the Australian names for two of them, as grades of wool, but he wasn't quite sure about the other one, and when I had explained to him what they were, of course he asked for a sample. I gave him a large part of what I had so he might have fun with his friends as I had had with him. But I never was entirely sure that he believed my story. (Laughter)

I have since had representatives of the German government in my office and asked them about the clothes they wore. One man told me he had on a suit made of half Zellwolle and half real wool. It looked like a passable piece of blue serge. Of course, I couldn't very well take his clothes away from him. I would like to have a piece of that cloth to really find out whether it is strong, whether it is warm, whether it is as durable as they say it is. I still have my doubts. (Laughter)

Here is a little sample of lanital which comes from Italy. About fifty per cent of the lanital goes with fifty per cent wool into the Italian uniforms. And there again they are told that is as warm as it would be if it were all wool, and having so been told of course it is! (Laughter.)

I also have here a sample of the fiber made from the protein of the soybean; just as the lanital is made from the protein of the skimmed milk. The soybean is really a very remarkable thing. Throughout the world almost as many things are made from soybeans as from the coconut, which feeds and clothes, and supplies beverages to those who rely on coconuts. So it is with the soybean. They make a synthetic type of milk from the protein of the soybean in China, also a type of cheese. And it is not surprising that in Japan they have been making this type of fiber on a fairly large scale. Also, Mr. Ford has been much interested in the same type of research and developmental work. That is a part of Mr. Ford's idea that the farmer should buy from those who buy from the farmer. So of course the more soybean products you can put into a Ford, the more reason why a farmer should buy the Ford. (Laughter.)

Getting now to our own country, you know, of course, about Vinyon and I understand you have had a paper on nylon in your program this week. We have all been very much interested in these new fibers not because they are ersatz but because they promise us relief from a natural national monopoly on the other side of the water. I have said to several of my friends that if anything goes wrong and these fibers are not as good as I have been telling people, I shall have to take a slow boat to China. (Laughter.)

I have been carrying around a pair of these nylon stockings for a great many audiences, and I have assured them as I must assure you ladies that they are not your size. I am sorry. (Laughter.) I shall have to retain them, and you will have to wait just a few months longer—I hope not very much longer—until these will be on the market.

I want to mention one or two other things as being of interest in our own country because of their connection with our progress in the twenty-five years since we had certain stringencies of raw materials.

You recall that we were obliged to go on a large-scale production of acetone by the fermentation of a low grade of corn and other agricultural wastes to produce enough acetone to help the Allies. Now we make this acetone by synthesis from petroleum gases. Here is a sample of such acetone of high purity, and made at a price that is more than competitive with the ordinary source. And from the same raw materials comes this very beautiful glycerin. No longer must we depend on the manufacture of soap to have a by-product glycerin in order to meet those demands. We did have a certain amount of glycerin made by fermentation of sugar in the last war, but the process was not very satisfactory. Here is a high grade product that can be made in great quantities from those vast natural resources, namely the gases from petroleum.

Here is a film of bentonite clay without any binder whatsoever by Dr. Hauser of M. I. T. You can see it is translucent. You can see it is quite flexible, and it is thought that from this may be developed a very satisfactory material in place of mica. The best mica comes from India and other seaport places. It would be a nice thing if we could have what we need from our own domestic supplies. This gives some promise, but is still in the developmental stage and not at all on the market.

Here is a cloth that is made wholly of glass. I am one of those who confess to being old enough to have enjoyed the World's Fair in Chicago in 1893, and I remember very well the dress of the Queen of Hawaii that was there. That dress was of no such fiber as we have today. One of the men who was identified with this development, having been teased a bit about it, just

to show it could be done, one summer wore underwear made of this glass material, and he got along very nicely, thank you. (Laughter.)

It has already been used to a considerable extent in the chemical industry and in the form of braids for insulation in the electrical industry. You can have no end of fun with this sort of thing if you have just the right setting. I broke a handle on a suit case when I was out at this factory. Of course, they had no ordinary twine around the place, so they gave me this cord, which is nothing but glass, and it tied up very easily. The stuff has a very high tensile strength.

I proceeded on my way to Washington with my suit case tied up with this bit of glass. With a great deal of pains I explained to the Pullman porter just what this was, that this handle had been tied on with a bit of glass. I can't go into all the details, but I think he was rather glad when I got off the car at Washington. (Laughter.) He wasn't quite sure where I might break out next.

Mr. Toastmaster, there is no end to this sort of thing. I have gone over my twenty-five minutes.

I wish there were four or five more hours to tell you more about these things that are going on, but I am sure those of you who are in any way in touch with scientific work know the trend. Germany is a nation depending to a very large extent upon science for the success of a highly unpopular program, — even unpopular with a part of its own population and long in the making. We do not use science just that way.

Consider what has been accomplished during the past quarter of a century in the United States, thanks to science, and you will find ample justification for the popular slogan of a great chemical company—"Better things for better living through chemistry." The scientist is not a miracle man, but fundamental research supported in continuity by educated patient money, as the late Dr. Teeple described it, may be depended upon to produce our requirements when the need is great enough. (Applause.)

Toastmaster Grimes: I am sure those of you who read *Industrial and Engineering Chemistry* will in the future read with a great deal more interest the sparkling articles which appear, because now we have seen in person the man who as the modern reincarnation of Houdini, can pull these technical rabbits out of a scientific hat and make them exceptionally interesting to us. We appreciate, Doctor, very much indeed, this interesting story.

In closing, I think of a clipping I saw the other day which had a background similar to that which has just been given to us, and especially to what is going on today. You will be interested in hearing it:

"Two opposing wars seem to me now in contest. The one, the law of blood and death, opening out each day new modes of destruction, forcing nations to be always ready for battle. The other a law of peace, work and health, whose only aim is to deliver man from the calamities which beset him.

"The one seeks violent conquests, the other the relief of mankind. The one places a single life above all victories. The other sacrifices thousands of lives to the ambition of a single individual.

"Which of those two laws will prevail, God alone knows. But of this we may be sure, that science in obeying the law of humanity, will always labor to enlarge the frontiers of life."

That was written by a fellow scientist back in the 1870's with a background of the Franco-Prussian War, Louis Pasteur, and I give it to you as a closing quotation. I would also call to your attention as we close this Nineteenth Annual Convention of the American Association of Textile Chemists and Colorists that we meet next year for our Annual Convention in the City of New York and, we hope, in much cooler weather. (Applause.)

Sodium Sulfate Error

in Measuring Acid Content of Carbonizing Baths*

H. C. OLSEN and W. B. PRESCOTT† with Dr. H. C. CHAPIN†††**

IN cloth carbonizing with sulfuric acid the concentration of the bath is controlled manually in accordance with titration, hydrometer observation, or conductance measurement; or it is controlled automatically through conductance. Titration with a suitable color indicator is accurate but bothersome, so the other methods are commonly employed. Our attention was called by a woolen manufacturer to serious discrepancies between results of gravity measurement and titration, in baths containing sodium sulfate, carried over presumably in the goods from previous dyeing operations. So it seemed worth while to determine the exact effect of sodium sulfate on

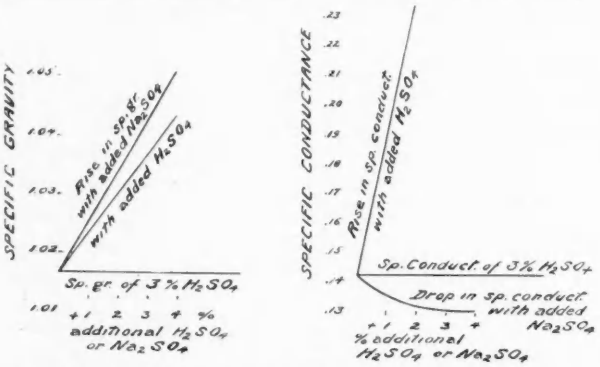
*Presented at Annual Meeting, Boston, Mass., September 16, 1939.

**National Starch Products, Inc.
†Calco Chemical Company.
††Lowell Textile Institute.

TABULATION of RESULTS

Grams H_2SO_4 per 100 grams solution.	3	3	3	3	4	4	4	4	5	5	5	5
Grams Na_2SO_4 per 100 grams solution.	0	1	2	4	0	1	2	4	0	1	2	4
Specific Gravity.	1.0166	1.0249	1.0335	1.0506	1.0252	1.0318	1.0404	1.0575	1.0298	1.0381	1.0466	1.0641
Specific Conductance in reciprocal ohms.	.1431	.1361	.1326	.1310	.1888	.1822	.1760	.1694	.2346	.2241	.2195	.2098

Slide 1



EFFECTS of ADDITIONAL ACID and of SODIUM SULFATE on SPECIFIC GRAVITY and CONDUCTANCE of 3% H_2SO_4

Slide 2

both gravity and conductance measurements of sulfuric acid concentration, with other influences, such as temperature change and the inaccuracies of ordinary hydrometers, excluded.

A standard solution of sulfuric acid was made, and its concentration determined by titration of a weighed amount with sodium carbonate and methyl orange; also a sodium sulfate solution, in which the per cent of sulfate was determined gravimetrically through precipitation of barium sulfate. From these two solutions were prepared gravimetrically the series of solutions on which measurements were made.

Specific gravities were determined by weighing in a calibrated Sprengel pycnometer of about 7 cc. capacity, filled in a thermostat at 25° centigrade, ± .15°. Conductances were measured in a U shaped cell having constant of about 33.9 reciprocal ohms. This was held in the same thermostat while conductance was measured with a Leeds & Northrup Students' Potentiometer, supplied with 1000 cycle alternating current from a microphone hummer.

Slide 1

Measurements were made on 3 per cent, 4 per cent and 5 per cent sulfuric acid, alone and with additions of 1 per cent, 2 per cent and 4 per cent of sodium sulfate. It is apparent that the sulfate contributes more to specific gravity than does the acid itself, causing an error in acid measurement more than proportional to the per cent of sulfate present.

On conductance of the acid solution sulfate exerts a depressent effect, presumably by decreasing acid ionization. Because the sulfate itself has conductance, the net result is but a slight lowering of conductance, small in comparison with the conductance of the acid solution. This contrast between the effects of sulfate on specific gravity and

Slide 3

Impurity Na_2SO_4	Intended percent H_2SO_4	Actual percent H_2SO_4 under gravity control	Actual percent H_2SO_4 under conductance control
1 %	3 %	1.71	3.15
1 %	4 %	2.71	4.14
1 %	5 %	3.71	5.25
2 %	3 %	.42	3.23
2 %	4 %	1.42	4.28
2 %	5 %	2.42	5.33

conductance can be shown more clearly by plotting specific gravity and conductance of 3 per cent acid, together with curves showing relative effects of acid addition and sulfate addition.

Slide 2

On the left, sodium sulfate additions are shown to raise specific gravity more than do equal additions of acid. On the right, conductance is shown to rise sharply with additions of acid, but to drop slightly with sulfate additions. Beyond a certain percentage of sulfate, greater or less according to the amount of acid present, the conductance curve for sulfate additions flattens out; and for larger ratios of sulfate to acid, it would eventually turn upward.

Upon specific gravity, in this range of concentrations, the effect of sodium sulfate appears to be regularly about 1.29 times the effect of an equal increment of acid. The resulting errors in control are shown in the next slide.

Slide 3

Concentrations of sodium sulfate exceeding 1 per cent were reported to us from carbonizing baths in normal use. Gravity measurements on such are clearly useless for control.

Also shown are the variable effects of sodium sulfate upon conductance. Covering a wider range than would be likely in mill practice, these show a maximum error of one-third of one per cent. While careful control would demand occasional correction based on titration, it is probable that the error really does not exceed the tolerance commonly permitted in fresh baths made up by hydrometer without temperature control.

Surface Cation Active Compounds

in the Textile Industry*

JACOB KATZ**

WITHIN the last few years a new series of organic derivatives have appeared in the textile industry under the name of "Cation Active Compounds."

The term "Cation Active" is somewhat novel and we shall attempt to explain just what type of substance these compounds typify. A chemical compound, such as a salt, when dissolved in water usually dissociates into two electrically charged particles, called ions. The ions are named cations (positively charged) and anions (negatively charged). Let us examine a simple substance like sodium chloride (NaCl); when salt is dissolved in water, it ionizes into a cation and anion:

$$NaCl \longrightarrow \underset{\text{(cation)}}{Na^+} + \underset{\text{(anion)}}{Cl^-}$$

If we are interested in making caustic soda, we would utilize the cation active part of the molecule likewise, if we wish to manufacture liquid chlorine, we would utilize the anion part of the molecule.

As we survey the numerous textile assistants used in the industry and classify them according to the "interesting part of the molecule," we find that most of these substances are *anion active*, i.e.:

1. Soap—RCOONa
$$RCOONa \longrightarrow \underset{\text{(cation)}}{Na^+} + \underset{\text{(anion)}}{RCOO^-}$$
2. Sulfonated Oil—RSO_3Na
$$RSO_3Na \longrightarrow \underset{\text{(cation)}}{Na^+} + \underset{\text{(anion)}}{RSO_3^-}$$
3. Sulfated Oil—$ROSO_3Na$
$$ROSO_3Na \longrightarrow \underset{\text{(cation)}}{Na^+} + \underset{\text{(anion)}}{ROSO_3^-}$$
4. Sulfated Alcohols—R_1OSO_3Na
$$R_1OSO_3Na \longrightarrow \underset{\text{(cation)}}{Na^+} + \underset{\text{(anion)}}{R_1OSO_3^-}$$
5. Alkylated Naphthalenes—$R_2C_{10}H_6SO_3Na$
$$R_2C_{10}H_6SO_3Na \longrightarrow \underset{\text{(cation)}}{Na^+} + \underset{\text{(anion)}}{R_2C_{10}H_6SO_3^-}$$
6. Sulfonated Nitrogen Derivatives—$RCONHR_1SO_3Na$
$$RCONHR_1SO_3Na \longrightarrow \underset{\text{(cation)}}{Na^+} + \underset{\text{(anion)}}{RCONHR_1SO_3^-}$$

In all these compounds we find that the cation is usually a metal of the alkali earth group and the anion is an organic substance containing more than 10 carbon atoms. If, in the above examples, the sodium ion is replaced by a long chain carbon complex and the anion is replaced by an inorganic radicle, or an organic acid radicle of small

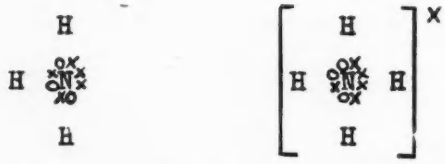
*Presented at Annual Meeting, Boston, Mass., September 16, 1939.

**Warwick Chemical Co.

carbon content, we have a derivative which we may now call "cation active"—due to the fact that the effective part of the molecule is carrying a positive charge (cation).

Most of these substances are organic derivatives of nitrogen bases. It might be advisable to emphasize here that next to carbon, nitrogen may be considered one of the most important elements in organic chemistry. Nitrogen, with an atomic weight of fourteen (14) is the lightest element in the fifth periodic group and has an atomic number of seven (7). This means, that there are five valency electrons in the outer orbit—lacking three to complete its stable orbit of eight. Because nitrogen has the property of sharing its electrons, the nitrogen atom exists in two normal states—trivalent and pentavalent. The trivalent derivatives based on the system of ammonia (NH_3) and the pentavalent derivatives based on ammonium hydroxide or ammonium halide:

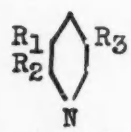
I II



The nitrogen bases are made by substituting the proper organic radicle for hydrogen in the above compounds. They may be primary, secondary and tertiary aliphatic amines, containing one or more nitrogen atoms in the molecule; the various cyclic nitrogen compounds of which pyridine is an excellent example; and the quaternary ammonium compounds. These bases, when reacted with the proper fatty derivatives, containing from ten to twenty carbon atoms in the molecule, result in three groups of cation active compounds which are becoming increasingly important.

(1) The acylated nitrogen bases and alkylated pyridine derivatives. The fatty acylated nitrogen compounds are insoluble in water, they are made soluble by acidulating the water until the derivative goes into solution. The resulting colloidal dispersion is immune to hard water, precipitated by alkali and stable to acids:—

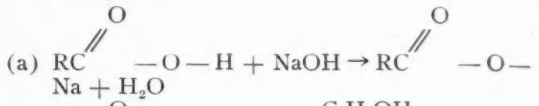
a.) $RCONHR_1$ $\xrightarrow{H_2O\ \ Acid}$ Soluble dispersion

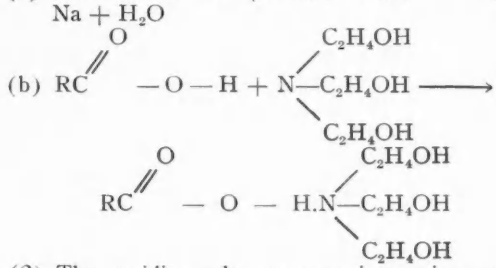
b.)  $\xrightarrow{H_2O\ \ Acid}$ Soluble dispersion

The salts of these acylated nitrogen bases and pyridine derivatives are much more stable, giving translucent solutions in H_2O, and forming temporary stable dispersions with anionic surface active compounds. Structurally the salts look like:

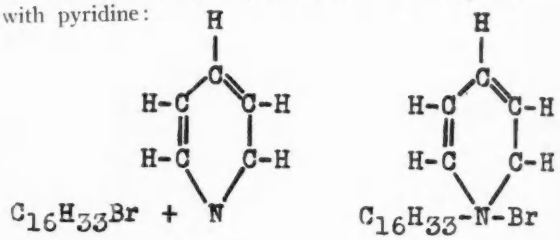
$RCONR_1NR_2 \cdot HCl$ or $RCONR_2NR_3 \cdot HAc$

They are made by attaching an inorganic acid such as HCl or HBr or an organic acid such as HCOOH, etc., to the nitrogen atom or atoms. You will note that the nitrogen atom here has a valence of three (3) and when nitrogen is in that state, it will form a salt with an acid. This can be shown by comparing a triethanolamine soap with an ordinary soap, i.e.:

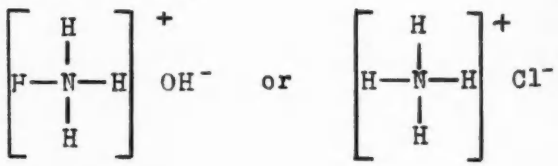
(a) 

(b) 

(2) The pyridine salts are very interesting and have opened up an entire new field of nitrogen bases. They are made by reacting alkyl halides such as cetyl bromide with pyridine:

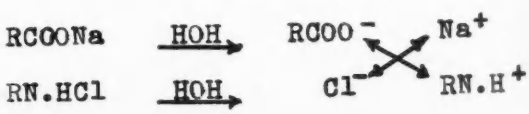


(3) One of the oldest type of cation active compounds are the quaternary ammonium derivatives. These compounds have been used as assistants in stripping vat dyes and have also been investigated for synthetic detergents. They are based upon the system of ammonium hydroxide or ammonium halide:



If the hydrogen atoms are replaced by appropriate organic radicles (at least one radicle containing more than 10 carbon atoms), the resulting compound becomes a cation active surface substance.

Now just what would happen, if a soap (anion active) were mixed with a cation active derivative:



As opposites tend to atract, the large anionic fatty part of the soap would combine with the large cationic part of the cation derivative, to form a huge fatty molecule insoluble in water. It is evident from the above example that anion active compounds should not be mixed with cation active derivatives for eventually the result would be a fatty precipitate. In general, these compounds may be considered as diametrically opposed to soaps, etc. Depending on their chemical structure, some are affected by alkali, whereas they are all stable in acid solution. Because it is the *type of anion* which determines their stability, they are immune to hard water and relatively high concentration of alkaline and heavy metal salts. It is more apparent when one writes these reactions chemically:

(1) $3RCOONa + Al(Ac)_3 = (RCOO)_3Al \downarrow + 3NaAc$ (ppt.)

(2) $RCONHR_1.HAc + Al(Ac)_3 \longrightarrow$ No reaction

This fact is exceedingly important—for one of the prime reasons for using synthetic products, is their immunity to hard water and heavy metals. The following table (I) show the results of ½ per cent solution of one of our products in a ¼ per cent solution of these salts.

TABLE I

Salts—Acids—Bases

To a 1 per cent solution of Appramine No. 2, equal volumes of a ½ per cent solution of the following chemicals were added and their effect was noted at room and boiling temperature. The resulting strength of these solutions was ½ per cent Appramine No. 2 and ¼ per cent salt.

Org. Chemical 0.25%	*Room Temperature*	*Boiling Temperature*
Aluminum Acetate, $Al(C_2H_3O_2)_3$.	Stable	Stable
Acetic Acid, $C_2H_4O_2$.....	Stable	Stable
CHLORIDES		
Barium Chloride, $BaCl_2$.....	Stable	Stable
Calcium Chloride, $CaCl_2$.....	Stable	Stable
Magnesium Chloride, $MgCl_2$.....	Stable	Stable
Potassium Chloride, KCl.....	Stable	Stable
Sodium Chloride, NaCl.....	Stable	Stable
Tin Chloride, $SnCl_2$.....	Stable	Stable
Zinc Chloride, $ZnCl_2$.....	Stable	Stable
Hydrochloric Acid	Stable	Stable
SULFATES		
Magnesium Sulfate, $MgSO_4$.....	Unstable	Unstable
Potassium Sulfate, K_2SO_4.....	Unstable	Unstable
Sodium Sulfate, Na_2SO_4.....	Unstable	Unstable
Sodium Bisulfate, $NaHSO_4$.....	Unstable	Unstable
Zinc Sulfate, $ZnSO_4$.....	Unstable	Unstable
Sulfuric Acid, H_2SO_4.....	Unstable	Unstable
NITRATES		
Barium Nitrate, $Ba(NO_3)_2$.....	Stable	Stable
Sodium Nitrate, $Na(NO_3)_2$.....	Stable	Stable
Lead Nitrate, $Pb(NO_3)_2$.....	Stable	Stable
Nitric Acid, HNO_3.....	Stable	Stable
MISCELLANEOUS		
Sodium Chlorate, $NaClO_3$.....	Stable	Stable
Potassium Dihydrogen Phosphate, KH_2PO_4	Stable	Stable

A close examination of the chemicals listed, show that the product is stable in the presence of all anions which have a valence of —1 (i.e.: acetate, chloride, nitrate, chlorate, etc.), but it is easily affected by anions with a valence of two.

The purpose for which these cation active substances may be used, depends entirely upon the substituted organic groupings attached to the nitrogen atom. The quaternary ammonium compounds and the pyridine salts may be used as auxiliaries for stripping vat dyes. Anthraquinone vat and indigo dyes are reduced by treatment in an alkaline liquor containing a reducing agent such as hydro and cation active compounds. Recently some very interesting patents have appeared using pentavalent phosphorus and tetra valent sulfur compounds for stripping all kinds of dyed fabrics. Examples are: Dodecyl-trimethyl-phosphonium bromide and diethyl-octadecyl-sulphonium-chloride. Most of these compounds are using along with reducing agents on the alkaline side.

Rendering dyestuffs fast to washing, has been greatly aided by the new cation active compounds. Various derivatives may be used, the explanation being, that the long chain cation reacts with the long chain anionic part of the dyestuff to form an insoluble complex:

$R_1NR_2 . HAc + R_3SO_3Na \rightarrow R_1NR_2 . HR_3SO_3 +$ NaAC

Many nitrogen derivatives have found use as leveling agents, wherein the cationic part of the molecule restrains the rate of dyeing. First the cationic active compound is added to the basic dye bath. When the material is thoroughly wetted and penetrated, the anion active substance is added to force the reaction.

Until recently, it has been almost impossible to impregnate textile fibers with rubber, the usual result was a rubbery, tacky coating. By means of the cation active compounds, it is now possible to produce with latex—soft, flexible, permanent finishes. As colloidal rubber is negatively charged, these long chain nitrogen complexes attract the rubber to the fiber and solubilize the latex into the fiber. The material is first treated with the cation active compound and then passed through a 10-15 per cent prevulcanized latex solution. Reports have been received on the successful application of latex to textiles in one operation by adding the cation active substance to the latex bath. Numerous applications will be made of this process, for the useful properties added to the fiber by the latex should result in many outstanding improved fabrics.

May I call to your attention the use of quaternary ammonium compounds for permanent softening and water-repellent finishes. This subject was competently presented yesterday afternoon.

I have touched upon various uses of these nitrogen complexes, but perhaps the greatest one is the application

of these substances to textile finishing. This is especially true when we consider the value of cellulosic materials. It is a known fact that when cellulosic fibers are immersed in water they assume a negative charge. In view of our previous subject matter, we would expect cation active compounds (which are positively charged) to be attracted to the cellulosic fibers. That is exactly what happens in practice—these compounds are strongly attracted to the fiber and fix themselves almost permanently upon same. Such being the case, we find that very small quantities of these substances (¼-1 per cent) are capable of producing exceptional finishes.

I say "exceptional finishes" for these cation compounds orient themselves upon the fiber entirely different than the usual type of sulfonated oil or alcohol. A good mental picture would be to consider the anion active compounds adsorbed longitudinally along the fiber, whereas the cation active substances are attached perpendicularly to the fiber. This physico-chemical attraction is strong enough to withstand numerous washings and many dry cleanings. The permanency can be readily shown by dyeing small swacthes of treated and untreated material with a wool dyestuff. The difference of color intensity is outstanding—the dyestuff will hardly attack the untreated fabric but will readily dye the treated materials. The dyeing experiment is repeated after each washing and dry cleaning, and the color difference noted.

The physical application of these compounds to textiles requires no new equipment. In fact by using these compounds, it may be possible to simplify your finishing process. We have found that our products may be applied successfully in the jig, dye beck, starch mangle, quetsches and print washers. As previously mentioned, these cation active compounds are not stable in the presence of anionic fatty derivatives. One must therefore apply these cation active materials at that point in the process of finishing, where fatty anionic derivatives will not be used thereafter. For example, it may be applied in the last rinse in the dye beck, or incorporated with gums and dextrines for use in the starch mangle, etc. Please note Table II on the compatibility of Appramine C —with gums, starches and dextrines.

Finishers demand that new products meet three main requirements:

1. Ease of application.
2. Efficiency of material.
3. Uniqueness of resultant finish.

I am sure they will find many of these substances an answer to their problems.

Before closing, I should like to demonstrate a very simple method of determining the "activity" (cationic or anionic) of any surface active compound. It consists essentially of two 45 volt radio B batteries connected in series, giving a total of 90 volt with an allowable draw of approximately 2 amperes. Ordinary rubber covered wires are connected to each terminal. The two ends are then connected to copper strips and immersed in a water solution of the surface active compound, if the product is cation active, it should plate out at the negative terminal,—if it is anion active, it should plate out at the positive terminal.

TABLE II

Gums

Two per cent solution of the following gums were prepared and to each one an equal volume of 1 per cent solution of Appramine No. 2 was added and their solubility was noted at room temperature (68° F.) and at boiling temperature (212° F.), the resulting concentration in each one was 1 per cent of gum and ½ per cent of Appramine No. 2.

GUM	*Room Temperature*	*Boiling Temperature*
Locust Bean	Stable	Stable
Tragacanth	Stable	Stable
Arabic	Stable	Stable

Starches

The same procedure as with the gums was followed with the following starches:

STARCH	*Room Temperature*	*Boiling Temperature*
Corn	Stable	Stable
Potato	Stable	Stable
Tapioca Flour	Stable	Stable

Dextrines

The same procedure as with the starches was followed with the following dextrines:

DEXTRINE	*Room Temperature*	*Boiling Temperature*
B_2 Gum	Stable	Stable
White Potato	Stable	Stable
White Corn	Stable	Stable
306 T. (Stein, Hall)	Stable	Stable
Oxotex E. H. (Stein, Hall)	Stable	Stable

ONE HUNDRED AND TWENTY-FOURTH COUNCIL MEETING

THE Council held its 124th meeting at the Copley Plaza Hotel in Boston on Friday morning, Sept. 15, 1939. Present were President Alban Eavenson, presiding; Duncan Ferguson and Arthur R. Thompson, Jr., Vice-Presidents; William R. Moorhouse, Treasurer; Louis A. Olney, Chairman of the Research Committee; William H. Cady, Elvin H. Killheffer and P. J. Wood, Past Presidents; Kenneth H. Barnard and Walter M. Scott representing Northern New England; Frederic A. Prisley representing Rhode Island; George L. Baxter, Henry F. Herrmann and Harold W. Stiegler representing New York; Charles A. Seibert and Herbert S. Travis representing Philadelphia; Thomas R. Smith representing Piedmont; Robert W. Philip, Chairman of the Southeastern Section; and

SECRETARY'S BALANCE SHEET—SEPT. 7, 1939

	Applications	*Dues Regular and Reinstate.*	*Dues Corporate and Sustaining*	*Miscellaneous*	*Bank Charges*	*Totals*
Received by Secretary, Nov. 1, 1938 to June 13, 1939.....	$932.50	$10,083.36	$2,730.00	$1,447.20	—$4.74	$15,188.32
Received by Secretary, June 13 to Sept. 7, 1939.....	270.00	117.00	25.00	233.34*		645.34
Total received	1,202.50	10,200.36	2,755.00	1,680.54	— 4.74	15,833.66
Transmitted to Treasurer.....	1,077.50	10,138.36	2,755.00	1,478.89		15,449.75
Leaving to order of Secretary..	125.00	62.00	.....	201.65	— 4.74	383.91

Harold C. Chapin, Secretary. The Secretary's report of the 123rd Council meeting and balance sheet of Sept. 7, and the Treasurer's report of August 31, were accepted.

A report was received from the Treasurer concerning bonding of Treasurer and Secretary as required by the new By-Laws. It was voted that the bonding of the Treasurer be for $35,000, and the Secretary for $5,000. Another report was received from a committee consisting of Henry F. Herrmann, William R. Moorhouse and the Secretary, regarding Sectional Treasurer's reports, and their approval by the Council as provided in the By-Laws. In accordance therewith it was voted that for the present the Council should not name specific purposes for which funds drawn from the general treasury by the Sections may be expended; but a prescribed form of Section Treasurer's report was approved, to the end that current practice be more accurately recorded and employed as an expression of opinion.

In approving a report by Elvin H. Killheffer, Chairman of the Committee on Coordination of Standards and Publicity, it was voted that the preliminary work already undertaken by Bertil A. Ryberg in accordance with the proposals of the Committee, be continued by him in his present capacity as Research Associate. Leonard S. Little was appointed by the President to represent the Association on the U. S. Dept. of Commerce Standing Committee on Woven Dress Fabrics, succeeding Hugh Christison, who had been chosen by the National Association of Wool Manufacturers to represent them on the same committee. It was voted that the next Council meeting be in New York on Friday, Nov. 17.

Each of the following was elected to the class of membership specified, as of thirty days from publication of application, provided no objection be received meanwhile by the Secretary.

Senior

W. E. Brewer	E. S. Horn	W. H. Mode
C. Broadhurst	C. W. Jackson	H. Moore
J. A. Bryant*	K. L. Jopke	W. L. Reed*
F. H. Crymes	D. Kaufman	J. W. Richardson
V. Froelicher	T. R. Kuzdal	W. D. Rochon
R. R. Fulton*	R. J. Little	J. Teson*
G. L. George	D. Maddox	J. J. Tobin
G. S. Haynes	J. V. McCombs	F. L. Travis
J. D. Hixon		C. Waters

MISCELLANEOUS ITEMS*

Launder-Ometer royalties.....	$128.00
Year Books	69.80
Knitted tubing	20.00
Crock-meter cloth	8.19
Dyed standards	4.00
Button	1.50
Reporters	1.20
Analytical Methods	.75
	$233.44
Correction, Carbonizing Reports.....	—.10
	$233.34

Junior

L. J. Battison	R. E. Noyes	F. L. Prescott
W. S. Kruchen		T. T. Wilheit

Associate

E. Bouchier	J. F. Maguire	M. D. Reeser
A. P. Howes	R. Mannheim	H. M. Strub
J. T. Howes	D. R. O'Dea	H. A. Virkler
A. B. Kuhn, Jr.*	C. S. Phillips	O. H. York

*As of Nov. 1.

The following were transferred from other classifications to Senior—G. M. Cote, W. R. Sargent, P. L. Shurr.

Respectfully submitted,

HAROLD C. CHAPIN, *Secretary.*

FALL MEETING, PIEDMONT SECTION

THE Piedmont Section held its Fall meeting in Charlotte on Saturday, October 7th, 1939, at the Charlotte Hotel.

There was a golf tournament Saturday morning for those that arrived early. This was well attended.

During the afternoon the members attended the football game held in Charlotte between the two leading technical schools of the Carolinas, Clemson College of South Carolina and North Carolina State College.

The banquet was held at 7:30 P. M. and was attended by two hundred and sixty members. The after-dinner speaker was Mr. W. F. Van Riper of E. I. du Pont de Nemours & Co., Inc., whose subject was "1939 Versus 1914." This was a very good paper on the chemical Industry today as compared to the situation this industry was in during the period of 1914.

Later the chairman excused all non-members and guests and called the meeting to order for the installation of the officers for the coming year.

The Piedmont Section during this year completed the By-Laws of the Section by which the officers are nominated by the Nominating Committee and notice mailed to the senior members. The members have twenty days to submit other nominations for officers. All nominations are then placed on ballots and mailed to the members who mail the marked ballots to the secretary. The ballots were counted before the business meeting. The new officers were than installed during the business meeting.

The officers for the coming year are as follows:

Chairman: Mr. H. E. Kiefer, Jr., Ware Shoals Mfg. Co., Ware Shoals, S. C.

Vice-Chairman: Mr. L. M. Byd, Scholler Brothers, Salisbury, N. C.

Treasurer: Mr. R. D. Howerton, Calco Chemical Corp., Charlotte, N. C.

Secretary: Mr. R. D. Sloan, Du Pont Co., Greenville, S. C.

Councilors: Mr. R. E. Rupp, Pacific Mills, Lyman, S. C. Mr. A. Henry Gaede, Laurel Soap Co., Charlotte, N. C.

Sectional Committee:

Mr. M. R. Pickler, Greenville, S. C.
Mr. T. W. Church, Jr., Charlotte, N. C.
Mr. Henry B. Dixon, Burlington, N. C.
Mr. Hugh Puckett, Charlotte, N. C.

After the installation of the officers, the meeting was adjourned.

Respectfully submitted,

J. W. Ivey, *Secretary*.

FALL MEETING, MID-WEST SECTION

A MEETING of the Mid-West Section was held at the Sherman Hotel, Chicago, Illinois, on Saturday, October 21st, 1939.

A discussional meeting was held at 3:00 P. M. under the able direction of Mr. Archie Alexander and Mr. Clarence Wille. Mr. Alexander read a paper, the subject of which was "The Setup and Management of a Hosiery Dye Plant." This was followed by a very interesting open discussion.

There were approximately sixty members and guests present.

Dinner was served at 7:00 P. M. in the College Inn. There were eighty-eight members and guests present.

The business meeting was called to order by Chairman Herman Boxser at 9:30 P. M. in the Crystal Room.

The Treasurer's report was read and approved.

Mr. B. C. Blowney was re-appointed Representative to the National Council.

The Sectional Committee presented a proposal that our Section should sponsor a program of five or six lectures, given by university professors and technical men. This was approved and a committee appointed to handle it, composed of Mr. A. J. Feit, Mr. E. A. Johnson and Mr. H. Boxser. Reports of these lectures will be sent to the members.

The meeting was then turned over to Dr. D. H. Powers of the Röhm & Haas Company, who gave a talk on "Recent Developments in the Use of Synthetic Resins for Textile Processing." Dr. Powers' talk was well received.

The meeting was adjourned at 10:45 P. M.

Respectfully submitted,

David A. Anderson, *Secretary*

MEETING, PHILADELPHIA SECTION

THE first meeting of the fall season was held at the Penn A. C. on Friday night, October 27th.

The speakers for the evening were Mr. H. E. Millson and Dr. E. L. Royer of the Calco Chemical Company. Mr. Millson and Dr. Royer also presented a motion picture study of "Dyeing Phenomena."

Also at this meeting we held our annual election of officers. The following men of this Section were elected to serve for the calendar year of 1940:

Chairman—Harold B. Dohner.

Vice-Chairman—John F. McCoy.

Treasurer—George E. Kohn.

Secretary—James P. Conaway.

Councilors—Herbert S. Travis, Charles A. Seibert, William A. Stringfellow.

Sectional Committee—Glen S. Hiers, John A. Levering, Arthur E. Jones, Wm. Ebersold.

The attendance for dinner was 104.

Respectfully submitted,

Jas. P. Conaway, *Secretary*.

MEETING, NEW YORK SECTION

THE first meeting of the 1939-40 season was held at the Swiss Chalet, Rochelle Park, N. J., on October 27, 1939.

The first speaker was Mr. Henry Roger of the Rolab Photo-Science Laboratories, Sandy Hook, Conn., who demonstrated the new "Projectoscope." The second speaker was Dr. M. J. Dorcas of the Carbon Sales Division, National Carbon Co., Inc., who spoke on "The Development and Application of the Three Phase Carbon Arc Lamp." He also demonstrated the "National" Accelerated Fading Unit and the "National" Daylight Equivalent Lamp. Both speakers were very interesting.

Mr. Patrick J. Kennedy was appointed general chairman for the national convention of the association, to be held in New York City during the latter part of 1940, by Mr. Louis S. Zisman, chairman of this section.

Total attendance: 100.

Respectfully submitted,

P. J. Kennedy, *Secretary*.

AMERICAN
DYESTUFF
REPORTER

RESEARCH AND PREPAREDNESS

THERE is no question that the research which started in Germany after the war of 1870 with France had a great deal to do with the fact that Germany was able to fight as long as she did in the World War. There is also some question regarding whether or not the fact that Germany led the world in scientific research did not make her overconfident in 1914 and that this had something to do with her losing that war.

Research not only brings prosperity during peace times but it also provides security in war time. It was the research which started in the early eighties and gave birth to scientific management which did more than any other one thing to raise our standard of living and increase our national income. It was the research which started during the World War, when our national security was threatened because we had become so dependent upon Germany that gave us our chemical industries and gave rise to new products, one of the latest of which is nylon and among which are numerous plastics now in general use.

Had we not felt the pinch of war due to the lack of the dyes and other chemical products we had been importing from Germany, had we conducted chemical research here as intensely before the war as we did during and after it, had we made ourselves more self-sufficient in all these respects, it might have happened that we would not have taken as active a part in the World War as we finally did. We might have saved the cost in billions of dollars and in lives, maimed bodies and the annually increasing cost of compensation to the veterans.

Our early research was confined largely to improving products and lowering their cost of production. This led to research in metallurgy and new alloys. It resulted in better designed and constructed machines, to more efficient layouts in factories, to better factory lighting and so on. On the whole, however, it was one sided. We were still dependent on the research of other countries and notably of Germany.

As long as we were at peace with Germany, we could not take over the German owned plants in this country nor use the patents on German processes which we had granted. German owned companies, obviously, would not be too enthusiastic about filling larger and larger orders for enemies of the German nation. When we did declare war on Germany we did use the patents, did take over German manufacturing facilities in this country, did profit by German research to a greater degree than ever before. Our failure to pay the attention we should have to chemical research before the World War, therefore, played some part at least in leading us into that war.

The international competition in research is important. It might prove as important as competition in armament. When the United States allows any other nation to exceed it in research in any field, it is permitting itself to become vulnerable to that degree.

The fact that we have not as many war planes in this country as others have does not disturb us much. When we learn, on good authority, that aeronautical research is being conducted more extensively and more intensely in any other nation we have good reason to be disturbed. We are disturbed first because that other nation is learning more about aeronautics than we are. We are disturbed secondly because that knowledge not only enables that other nation to build better war planes but better commercial planes as well. If we do not speed up our research our entire airplane industry is threatened and this is one industry it is important we make grow and prosper as a matter of preparedness.

When we read about lanital we may not give it especially serious thought. We have an ample supply of wool. At least in peace time we have that supply. The nations developing and using this process may not have so good a supply. They need this substitute.

We might not have such an ample supply of wool during a long war. Nations with adequate producing facilities for lanital might have a decided advantage over us in this respect. From a peace time view there is also our dairy farmers to consider. Is the production of lanital in foreign countries going to place them in a position to export to this country more and more dairy products and to sell them here at a price lower than our own producers can meet? Are we placing ourselves in a position where in time of war, a war which would cut us off from some of our sources of supply of dairy products we would experience a serious shortage here?

If we wish to remain at peace, it would seem wise to speed up our research in every field to a point where it equals or exceeds that of any other nation in the world in that field. If we do that we are secure. If we do not, we are bound to find ourselves at a more or less disadvantage just as we were during the World War.

It is well to bear in mind that we cannot count on peace. That war which ended in 1918 was supposed to end all wars. There has not been a single year since that there was not at least one war being fought. Some were smaller than others. Some were shorter than others. Some did not appear to be especially important. The total number of wars which have started since the eleventh hour, of the eleventh day of the eleventh month of 1918 turns out to be 21. Twenty of those did not affect us very much. We do not know yet how serious the last, the twenty-first will prove to be. As a matter of fact, we are not exactly certain in regard to just how the nations will line up on each side. In July, 1939, there seemed no slight possibility that Russia would be fighting on the side of

Germany. In September of that same year we found the two nations invading Poland and consulting in regard to just which portion of that country each took.

The United States possesses great natural resources. It has enormous producing capacity. It has probably given more attention to efficient mass production than any other nation in the world. This makes it an important nation to sue for friendship. Because of this fact we find that Japan appears to desire to maintain friendly relations with us at least to a greater degree than she has demonstrated a desire for continued friendly relations with Great Britain.

When we entered the World War we did so under the mistaken impression it was going to spread freedom in the world, that there would be a prolonged period of peace afterwards. Those who fell in action still retained the conviction they were giving their lives to make the world safe for democracy, to make all nations more friendly toward each other. The actual results have proved extremely disappointing to those who offered their lives in that conflict but survived. They are not so certain we can make Europe peaceful by force of arms.

We may be able to keep out of war ourselves and go much farther toward maintaining peace in Europe if we pay more and more attention to research. We are in a much stronger position in the research field than we ever were before. Were we able to lead the world in every field, that would give us a power and an influence we could not exert in any other way.

Let there be no field of research in which we do not surpass every other nation in the entire world, let us maintain a producing capacity greater than that of any other nation and it becomes more important than ever for every other nation to be friendly toward us. The United States is unique in that its area is not only large but that so much of it borders on oceans. There is no country adjoining us which is large enough to attack us with any great hope of a successful issue. In addition to all this we have natural resources which make us nearly self-sufficient.

To a marked degree, however, successful self-sufficiency depends upon research. Other nations are carrying on research partly to discover substitutes for that which they do not have in their countries. We may not need those substitutes but we may need the by-products that result from the knowledge gained in the search.

If we can lead the world in research, we can control the world to a degree we cannot in any other way. We will become independent of every other nation in every way, will not have to depend on any other nation for anything. On the other hand, more and more nations will have to depend upon us. We should be able to settle disputes which we could not under other conditions. If we do become involved in war we will be in a stronger position, better able to make that war a short one and to win a conclusive victory.

To a far greater degree than ever before wars are fought in research laboratories. Other things being at all equal, that side which has the best research laboratories and the best researchers, which leads in all fields of research stands the best chance of winning. When we reach the point where it is recognized in all parts of the world that we lead in every field of research, every nation will be careful not to make us unfriendly. We will be too well prepared to win any war into which we might be forced and to win it quickly.—J. E. BULLARD.

Photochemical Decomposition

(Concluded from page 656)

absence of light was also run at 105° C. The data, given in Table 2, show that no significant changes in sulfur or cystine contents of the wool occurred during the prolonged heating at 60° and 105° C.

Although the presence of moisture in the atmosphere surrounding the fibers during irradiation is not required for the primary reaction involving the decomposition of the cystine, the present work indicates that it does play an important role in the secondary process involving the evolution of the hydrogen sulfide from the irradiated fibers. Furthermore, it should be emphasized that the primary reaction is much more rapid than the secondary reaction, and that the rate of evolution of hydrogen sulfide from the wool is determined by the rate of the secondary process. In addition it appears that the secondary process is essentially a photochemical one as indicated by the BCD and B′C′D portions of the curves in Fig. 1. That a small amount of hydrogen sulfide is probably split from irradiated wool by thermal processes is indicated by the slopes of BC and B′C′, but a comparison with those of the CD and C′D′ portions shows that the amount is extremely small.

The authors can, at present, offer no complete explanation of the photochemical processes involved in the decomposition of the cystine in wool. The results to date suggest that the initial stage of the photochemical decomposition is an absorption of the radiant energy resulting in the dissociation of the R-S-S-R group, probably into $R\text{-}S^{+}$ and $R\text{-}S^{-}$ ions. This reaction does not appear to be catalyzed by moisture. A cleavage of this type for the photochemical decomposition of cystine itself has been postulated by Anslow and Foster[5], who showed that when radiant energy is absorbed by this substance, the linkage between the halves of the molecule is weakened, which results in the disruption of the molecule. A possible secondary reaction would then be the reaction of the products of the primary process with water to form RSH and RSOH compounds. The later are unstable and generally decompose with the liberation of hydrogen sulfide.

IV. REFERENCES

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[2]M. Harris and A. L. Smith, J. Research NBS *20*, 563 (1938) RP 1091.
[3]M. X. Sullivan, Public Health Reports *86*, (1930).
[4]G. Miller and V. du Vigneaud, J. Biol. Chem. *118*, 101 (1937).
[5]G. A. Anslow and M. L. Foster, J. Biol. Chem. *97*, 37 (1932).

BOOK REVIEWS

An Introduction to the Chemistry of Cellulose. *J. T. Marsh, M.Sc., F.I.C., F.T.I., and F. C. Wood, Ph.D., F.I.C., F.T.I., with a Foreword by Sir Kenneth Lee.* 431 *pages,* 111 *Figures including graphs and tabulations. D. Van Nostrand Company, Inc.,* 250 *Fourth Ave., New York, N. Y.* 1939. *Price* $7.50.

Cellulose chemistry has rapidly increased in importance and interest along with the development of the different rayons. Many other fields of usefulness of cellulose and its compounds have in recent years become of increasing importance, i.e., plastics, lacquers, explosives and the materials used in the finishing of textiles. Paper chemistry has always been fundamentally cellulose chemistry. The same may be said of the chemistry of bleaching, mercerizing of cotton and the processing of other vegetable fibers.

The book is divided into five parts, the first of which is concerned with the occurrence and general properties of cellulose.

Part two deals with such subjects as mercerization, the swelling of cellulose under different conditions and the action of ammoniacal copper hydrate solution and carbon bisulfide upon cellulose in the preparation of rayon spinning solutions.

Part three discusses the subject of hydro cellulose and oxycellulose.

Part four, the derivatives of cellulose.

Part five, the constitution and structure of cellulose.

In their preface the authors state that it is hoped that the book will be of value to the ordinary chemist and for this reason they have endeavored to maintain a balance between the descriptions of the purely scientific phases of the subject and the practical applications. This book can be highly recommended since it brings together in a comparatively condensed form the more important considerations regarding cellulose and its modern uses.

Thorpe's Dictionary of Applied Chemistry. *(Fourth Edition.) Vol. II (Bi-Chemical Analysis). J. F. Thorpe and M. A. Whiteley.* 711 *pages. Longmans, Green & Co., New York. Price* $25.00.

The Fourth Edition of Thorpe's Dictionary of Applied Chemistry (Vol. I) was reviewed with considerable detail in the November 29, 1937, edition of the AMERICAN DYESTUFF REPORTER. The general scheme of publication and arrangement has been followed in the second volume and the editors are again to be congratulated upon the quality of the text and the publishers upon the excellent typography and general physical makeup and appearance of the book. The form in which organic structural formulas have been produced is particularly clear and far better than is found in most publications.

Judging from the first two volumes, this dictionary will be the most complete set of books of its type which has ever been published. Great care has been taken not to eliminate any subject of importance and in many cases sufficient detail is given to constitute a working treatise upon the particular subject at hand. An example of this is the section on Chemical Analysis which extends through one hundred seventy pages.

When the first volume was published the editors solicited criticisms and these have been considered wherever it was believed they would contribute to the present and subsequent volumes. Especially to be commended is the method by which later volumes are used as a means of bringing subject matter of earlier volumes up-to-date. This appears to have worked out very well. As far as has been published, the increase in volume of the fourth edition as compared with the third is approximately forty per cent. It will be the aim of the editors throughout this fourth edition to give the reader a concise and readable account of the condition of modern chemistry written in a form which can be understood not only by the expert but also by the reader having a general knowledge of chemistry.

L. A. O.

Handbook of Chemistry. *(Third Edition.) Compiled and Edited by Norbert A. Lange, Ph.D. Assisted by Gordon M. Forker, B.S. (Chem. Eng.) Pages* 1,850 *including an appendix of mathematical tables and formulas by Richard S. Burington, Ph.D. Handbook Publishers, Inc., Sandusky, Ohio.* 1939. *Price* $6.00. *Special price to teachers and students.*

The Third Edition with approximately 1,850 pages is the largest edition of this handbook which has so far been published. Seventy-five individuals, for the most part experts in their particular line, have contributed their criticisms and suggestions as well as text material in the preparation of this book. As far as possible this third edition has been revised and any known errors corrected and all material brought up-to-date. The references to compounds listed in the tables of Physical Constants of Organic Compounds and Refractive Index of Liquids have been augmented to include references to the volumes of Beilstein which have appeared since the previous edition.

Perhaps the most important change in this edition is the inclusion of new material of a nature intended to make the whole work self-explanatory. In order to facilitate this the section on definitions has been extended to include a definition of all column headings and technical terms used throughout this Handbook. With this same thought

in mind, a table of the commonly accepted thermo- and physico-chemical symbols, and a table of dimensional formulas have been added.

The following tables have been offered for the first time in this third edition:

Physical and Mechanical Properties of Cast Metals.
Reduction of Barometer Readings to Sea Level.
Symbols of Thermo- and Physico-Chemical Quantities.
Dimensional Formulas.
Properties of Various Photographic Film Emulsions.
Comparative Photographic Emulsion Speed Ratings.

This Handbook is particularly useful since it has been printed on a fine quality non-glare paper; has a comparatively large page; easily read type and excellent binding. This book should prove a valuable asset to every student, teacher and practitioner of chemistry.

TRADE NOTES • NEW PRODUCTS

• ANNUAL MEETING, U.S.I.T.R.

The tenth annual meeting of the U. S. Institute for Textile Research was held on November 2nd, at the Hotel Pennsylvania, New York, N. Y. The meeting included a luncheon, a business meeting, an open research conference of "Wool Processing in the Light of New Knowledge of the Chemical and Physical Properties of Wool" and a speaking program. In his annual address President E. H. Killheffer pointed out that since Textile Foundation directors have gone on record with a program of economic and fundamental scientific textile research, the financing of which will exhaust their present fund in eight or ten years, it is high time that they or some other body representative of the whole industry should take steps to ensure the permanency of these types of research. He called attention to the fact that the Institute was organized primarily for fundamental research promotion and conduct and was the only textile body that had demonstrated its ability to do so on a co-operative basis of financing, admitting, however, that the Institute had failed thus far to even approximate an adequate program and financing. He referred to a proposal having this objective in view that he made two years ago, and that involved an annual fund of $2,000,000 to be subscribed by the industry, and also to Fuller E. Callaway's proposal of an annual fund of $25,000,000. In conclusion he suggested that the Textile Foundation or the Institute should call a conference, to include the officers of every textile association, with the objective of developing of a plan of self-assessment adequate to finance a comprehensive and continuing research program.

Franklin W. Hobbs, president, Arlington Mills, and Chairman of the Textile Foundation, introduced the speakers who reported on that body's research: Dr. Robert E. Rose, chairman Advisory Committee on Scientific Research, and a director of the Institute, and Fessenden S. Blanchard, member of the Foundation's Advisory Committee on Economic Research, and chairman of the Institute's Committee on Economic Research.

For the Institute, Chairman W. D. Appel of the Research Council, reported on the research on Warp Sizing of Spun Rayon and Cotton-Spun Rayon that is starting at North Carolina State College Textile School, Raleigh, N. C., and introduced Dr. A. C. Walker, chairman, Administrative Committee for the Institute's Textile Drying Research at the National Bureau of Standards, now in its third and final year.

Officers and Directors Elected

At the annual meeting of members formal reports were presented, and the following directors were elected for a term to expire in 1942: Arthur Besse, president, National Association of Wool Manufacturers, New York, N. Y.; H. M. Chase, research director, Riverside and Dan River Cotton Mills, Danville, Va.; Daniel E. Douty, president, U. S. Testing Co., Hoboken, N. J.; Ephraim Freedman, director, R. H. Macy & Co.'s Bureau of Standards, New York, N. Y.; Russell T. Fisher, president, National Association of Cotton Manufacturers, Boston, Mass.; H. Grandage, vice-president, Clark Thread Co., New York, N. Y.; Edward R. Schwarz, professor of textile engineering, Mass. Institute of Technology, Cambridge, Mass.; the Chairman of the Research Council, ex officio.

For a term expiring in 1940: W. M. McLaurine, secretary, American Cotton Manufacturers' Association, Charlotte, N. C., succeeding Philip A. Johnson, resigned.

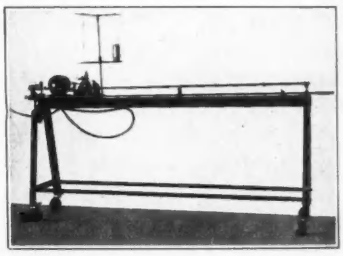
The only new members of the Board are Messrs. Fisher and McLaurine.

At the meeting of the board of Directors the following officers and members of the Executive Committee were re-elected; President, Dr. Elvin H. Killheffer; Vice-Presidents: Louis A. Olney, Edward R. Schwarz; Treasurer, Ernest N. Hood; Secretary, Charles H. Clark; Executive Committee: John Bancroft, Jr., Earl Constantine, Alban Eavenson, Ernest N. Hood, Robert E. Rose, Edward R. Schwarz, Douglas G. Woolf, the President ex officio, and the Chairman of the Research Council, ex officio.

While all of the sessions were well attended, the research conference in the afternoon, which was open to all interested in the subject under discussion, attracted the largest audience of over 100.

• NEW SEWING MACHINE LINE

Birch Brothers, Inc., 32 Kent Street, Somerville, Mass., announce that their new Railway Stand, fitted with ball bearing rubber-tired swivel castors, makes their line of "Supreme" Butt-Seam Sewing Machines, using the Merrow Head, complete, as they have been manufacturing an improved Gray-Room mounting and a portable motor-driven mounting for some time.



The Head is mounted in such a way that it is very accessible, the motor not interfering. The machine is made with a lever for keeping the pressure foot raised, leaving the operator with both hands free; the cloth is pulled taut by a lever connected to one set of pins; the travel of the head is automatically stopped when the seam is completed.

• PRESENTATION OF MEDAL

The Chemical Industry Medal for 1939 was presented on November 10th to Dr. Robert E. Wilson, President of Pan American Petroleum & Transport Company, at a joint meeting of the American Section of the Society of Chemical Industry, the New York Section of the American Chemical Society and the New York Section of the American Institute of Chemical Engineers, held at The

Chemists' Club, New York City. Dr. Wallace P. Cohoe presided. Dr. Thomas Midgley, Jr. spoke on the personal side of the medallist's life and Dr. Bruce K. Brown spoke on his technical achievements. Mr. James G. Vail presented the medal.

Dr. Wilson, after accepting the medal, spoke on the tremendous quantities of refinery gases produced by cracking in this country for which different uses have been developed, particularly during recent years. The talk was concerned mainly with actual commercial processes rather than possibilities which have only been demonstrated in the laboratory. For the production of the basic aliphatic chemicals, they stand in much the same position as coal tar does for the aromatics. In addition, many new catalytic processes have been developed for producing high anti-knock gasolines, special aviation fuels, and other synthetic products which, in volume at least, are even more important to the petroleum industry than the more strictly chemical uses.

• JOINS MERCK

Charles P. Robinson, formerly of Ciba Co., Inc., is now associated with Merck & Co., Inc., Rahway, N. J. Mr. Robinson will interest himself in textile specialties.

• CALCO CHEMICAL DIVISION

Effective as of November 1st, 1939, The Calco Chemical Company, Inc., which has been a wholly owned subsidiary of American Cyanamid Company since March, 1929, ceased to be a separate corporation and is now operating as Calco Chemical Division, American Cyanamid Company.

As Calco Chemical Division, they will operate, as in the past, with a separate organization for manufacture, sales, service, etc., and no changes are contemplated in the management, personnel or policy.

• MEETING, A.A.T.T.

A meeting of the American Association of Textile Technologists was held on November 1st at the Architectural League, New York City. Speakers were: Harry Price, Richards & Geier, patent and trade mark attorneys, who spoke on "Textile Patent and Trade Mark Protection" and A. W. Zelomek, economist for Fairchild Publications, who spoke on "Trends of Raw Materials."

The board of governors of this association recently announced that the membership had elected Ernest Geier, of the Duplan Silk Corporation, an honorary member. Mr. Geier is the first person to be so honored by this association, which comprises about 150 technologists, mostly engaged in fabric development and testing work.

• CENSUS OF MANUFACTURES

Starting January 2nd, 1940, each manufacturing establishment in the United States will be visited by census enumerators equipped with schedule forms, who will obtain necessary reports for the twenty-third Census of Manufactures. The census will cover all manufacturing, printing and publishing establishments whose value of products exceeds $5,000 covering the year which ends on December 31, 1939. The information to be published in the census reports will include the number of establishments, number of proprietors and firm members, number of salaried personnel and wage earners and salaries and wages paid during the year, cost of materials, fuel, purchased electric energy and contract work, value of products, and the value added by manufacture. There are also a number of other statistics that will be collected. Approximately 200,000 establishments in 400 separate industries will be covered. The reporting is required by law and it is requested that all will report promptly as this will contribute to making the census complete and accurate and the statistics timely.

• PERKIN MEDAL AWARD

Dr. Charles M. A. Stine has been elected to receive the Perkin Medal of the Society of Chemical Industry for 1940. The medal is awarded annually for valuable work in applied chemistry.

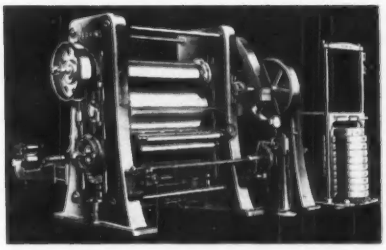
The selection is made by a committee representing the five chemical societies in the United Staes.

Shortly after receiving the degree of Ph. D. in 1907 from Johns Hopkins University, he entered the employ of E. I. du Pont de Nemours & Company. He was assigned to the Eastern Laboratory, and was in charge of the organic chemical research from 1909 to 1916. In 1917 the increase in the company's interest in general organic chemical problems led to the transfer of Dr. Stine to the Wilmington Office as head of the Organic Section of the Chemical Department, in which position Dr. Stine was for a time in charge of the research on products and processes which are embraced by the general term "the dye industry." In 1919 he was appointed Assistant Director of the Chemical Department, and became Director in 1924. He served as Director of the Chemical Department until 1930, when he was elected Vice-President in charge of research. In the same year he became also a member of the Executive Committee, and Board of Directors. He is at present serving in all three of these capacities.

The medal will be presented on January 12, 1940 at a meeting to be held at the Chemists' Club, 52 East 41st Street, New York City. Details will be announced later.

• HYDRAULIC CALENDAR

B. F. Perkins & Son, Inc., Holyoke, Massachusetts, have recently built for American Dyeing Corporation of Rockville, Connecticut, a three-roll hydraulic calendar which is said to provide a marked advance in the finishing of rayon. The calendar allows more pressure and greater operating speed than heretofore available.



The American Dyeing Corporation manufacture a general line of rayon piece goods for men and women's clothing, underwear and millinery, with particular emphasis on their output of cellulose acetate rayon.

• JORDAN PERSONNEL

William J. Platt has been appointed as general manager of W. H. & F. Jordan Jr., Mfg. Co., 3047 Amber Street, Philadelphia, Pa. Mr. Platt is well known in the textile trade. The chemist of the Jordan organization is Hillary Robinette, graduate of Temple University, and who was employed for six years in the organic research laboratories of Rohm & Haas Co., Inc. The company wishes to point out that, in the recent reorganization, only the technical, executive and sales departments were concerned whereas the plant personnel remains the same. They state that the present sales force consists of technically trained men, able to meet any problems that may arise.

• PUMP CATALOG

An old saw maintains there is nothing new under the sun—but the recently issued 64 page catalog of Peerless Pump Division of Food Machinery Corporation, Los Angeles, refutes this idea in an impressive fashion.

The catalog covers the full line of Peerless Pumps, including water-lubricated turbines, oil-lubricated turbines, propeller pumps, mine pumps and the new Peerless Hi-Lift pump. Several pages are required to show the many different styles of turbine pump heads supplied by the company. A clever use of spiral binding, folded inserts, and hinged partial-page flaps makes this catalog one of unusual interest.

Ten different types of turbine pump heads are illustrated with full details on

water lubrication and oil lubrication of all models. Valuable hydraulic engineering data fills 12 pages while 38 installation views provide engineers with suggestions as to power hookup and methods of installation. Copies of the catalog may be obtained by writing Peerless Pump Division, Food Machinery Corporation, 301 West Avenue 26, Los Angeles, California.

• DYE SHORTAGE THREATENED IN NETHERLANDS INDIES

With supplies shut off from Germany, weaving mills and other dye-consuming interests in the Netherlands Indies are threatened with a shortage of aniline, ultramarine, artificial indigo, and alizarine dyes, according to reports from the American Trade Commissioner at Batavia made public by the Commerce Department.

Names of the leading importers of dyes in the Netherlands Indies may be obtained by accredited American firms from the Chemical Division, Department of Commerce, or any of the District Offices of that agency located in principal commercial centers in the United States.

• FOLDER ON TANK PAINTING

How to obtain maximum results in painting interior and exterior surfaces on all types of tanks and supporting structures is fully explained in a new folder recently published by the American Asphalt Paint Company, manufacturers of Valdura Tank Finishes.

Realizing the many difficulties usually encountered in painting tanks, the paint technicians of this company compiled all available information from experienced painters who have specialized in this particular field, and with the aid of their valuable knowledge have included in this folder many helpful pointers such as the following:

General Instructions and Surface Preparations in applying Tank Finishes—How to paint Metal, Wood and Concrete Tanks, both interior and exterior surfaces—How to quickly estimate surface areas and amount of paint required on various size and style Tanks and Supporting Structures.

This new folder is available from the American Asphalt Paint Company, 43 E. Ohio Street, Chicago, Illinois.

• COAL FOR CHEMICALS

More than 46 million tons of bituminous coal were used for chemical purposes last year, declared Dr. James K. Hunt, a technical advisor of E. I. du Pont de Nemours & Company, in addressing a meeting of the National Coal Association in New York on October 24th. He said chemical products derived from coal through research have contributed greatly to American self-sufficiency.

Coal's rapidly expanding chemical utilization, Dr. Hunt emphasized, is indicated by the increase in coal-tar dye production from 6,000,000 pounds in 1914 to 122,000,000 pounds in 1937. Moreover, he said, the United States owes much of its present economic security to research based on coal.

"Such products as dyes, many essential medicinal chemicals, nitrogen fertilizer materials, neoprene chemical rubber, nylon bristles and nylon textile fiber all stem from coal," the speaker declared. "These offspring of the scientist's test tube represent strategic materials for which the country depended largely or wholly upon imports only a few years ago."

Dr. Hunt said coal has become increasingly important as a chemical raw material, from that day in 1856, only eighty-three years ago, when William Perkin made the first coal-tar dye. Without access to the chemicals derived from this material, he asserted, the work of the research chemist directed to the development of new and improved products would be tremendously handicapped.

"Through research," Dr. Hunt continued, "there has sprung into being in this country a great diversified chemicals industry, with coal as one of the principal raw materials. This industry, which could scarcely be said to exist twenty-five years ago, has made the United States largely self-sufficient.

"Many of you will doubtless recall the situation in this country at the outbreak of the World War in 1914. Then, many of our industrial activities were dependent upon imports. Employment of millions of our workers was threatened, particularly in the textile industry which was almost wholly dependent upon foreign-made dyestuffs. Even the health of our people was endangered because the importation of many important medical supplies had been cut off.

"Today, in sharp contrast, practically every important industrial and medicinal need is being filled, and, I am confident, will continue to be filled, by American factories on American soil, whatever situation may arise from the present European conflict. This is due in no small part to the accomplishments of scientific research during the past two decades. Chemicals derived from coal have played no small part in these accomplishments.

"In 1914 this country did not have a single plant for extracting nitrogen from the air and transforming this element into the nitrates and other chemicals so vital to agriculture, industry, and the national defense. Then we were almost completely dependent upon natural nitrates, imported from Chile. Today, in contrast, America is self-sufficient in nitrates, through chemistry.

"Similarly, the United States produced less than one-tenth of the dyes it consumed a quarter of a century ago, and even that meager proportion was made from imported intermediates. Now a great organic chemicals industry that has come into being since 1917 is supplying 96 per cent of the country's needs in dyes and comparable proportions of other fine chemicals as well. Needed medicinals are produced in abundance. There is no cause today for worry over war abroad curbing our supply of drugs.

"Another highly essential material is rubber, imported from far-away lands under foreign control. It presented a grave problem during the World War as supplies dwindled and prices rose. This need not happen now. Neoprene, the chemical rubber made from coal, limestone, and salt, has every promise of functioning satisfactorily in place of natural rubber. Its price is less than that of rubber during the early World War days.

"Typical of the new era of chemical synthetics is nylon, derived from coal, air, and water. Nylon, a protein-like material, gives textile fibers of unusual strength, elasticity, and wearing qualities. Nylon fibers are especially suitable for use in fine hosiery.

"Another application of nylon is in brush bristles. In 1914 there was no synthetic equivalent for natural bristles. This country was then dependent upon shipments it could get from the far reaches of China and Siberia. Today this necessity is being met chemically through nylon."

• CLASSIFIED ADVERTISEMENTS •

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

POSITION WANTED: Chemist desires position. Twenty-seven years' experience. Fast colors, new finishes, all types laboratory work, yarn, piece goods, cotton or rayon. Excellent health. Write box No. 212, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.